

IDS # 5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Docket No. 0290112

Art Unit: 1109
Examiner: H. Myers

In re application
PETER J. JESSUP ET AL.

Serial No. 08/077,243
Filed: June 14, 1993

GASOLINE FUEL

The Honorable Commissioner
of Patents and Trademarks
Washington, D. C. 20231

Sir:

INFORMATION DISCLOSURE STATEMENT NO. 5

In addition to the references submitted with IDS No. 4, enclosed herewith, Applicants further desire to make the Examiner aware of the following:

Section A

Applicants and their attorney recently became apprised of more materials of character similar to those submitted in IDS No. 3, Section F, Attachment I. Specifically, the materials discovered were gasoline survey data in internal corporate memoranda of applicants' assignee, Union Oil Company of California, dba Unocal. A review of the materials for gasolines of RVP \leq 7.5 psi was made, and the pages containing such data (and not already in Attachment I of IDS No. 3) accompany this document as **Attachment J** (four pages). For the convenience of the Examiner, the RVPs \leq 7.5 psi on Attachment J are circled in red.

Section B

Refinery Data--Automotive Fuels

Applicants and their attorney also recently became apprised of internal corporate documents containing data pertaining to gasoline produced from its Los Angeles refinery between 1972 and

1983. A review of these documents for references to gasoline blends of RVP \leq 7.5 psi was made, and the pages containing such data accompany this document as **Attachment K** (seven pages). Again, for the convenience of the Examiner, the RVPs \leq 7.5 psi on **Attachment K** are circled in red.

In addition, internal corporate documents containing data pertaining to gasoline produced from its San Francisco refinery between 1968 and 1978 were recently discovered. A review of these documents for disclosures of gasoline blends of RVP \leq 7.5 psi was made, and the data for each blend of RVP \leq 7.5 psi is shown in **Attachment L** (twenty-one pages). Again, for the convenience of the Examiner, the RVPs \leq 7.5 psi on **Attachment L** are circled in red.

(It is specifically noted that applicant makes no acknowledgement or admission that all data on any attachment herewith submitted are necessarily accurate. For example, it would seem beyond doubt that the reported RVPs of 5.7 and 2.6 psi, respectively, on pages K-3 and K-4 of **Attachment K** are in error, such values for commercial gasolines being, at a minimum, highly, highly suspect.)

Section C

Refinery Data--Aviation Fuels

Among the internal corporate documents recently reviewed included tables of properties of aviation gasolines produced in the Los Angeles refinery of applicants' assignee. **Attachments M and N** (each four pages) are representative of the data pertaining to these aviation fuels, with **Attachment M** being for 80-87 Octane Aviation fuel and **Attachment N** for 100-130 Octane Aviation fuel.

The Examiner has in IDS No. 3 previously been made aware

that aviation gasolines have some features similar to the fuels employed in the invention, e.g., RVP & T50. (See IDS No. 3, Overview, page 5 and Section A, page 17.) Attachments M and N also show the low RVP and T50 values for aviation gasolines, as well as low T90s. Thus, in a sense, the fuels employed in applicants' claimed process have some features (RVP, T50, & T90) more similar to aviation fuels than typical automotive fuels.

Nevertheless, insofar as applicants are aware, the fuels required in applicants' claims are novel and non-obvious over aviation fuels. And certainly, the use of applicants' fuels, no matter how close they may be to prior art aviation fuels--indeed, even if fully anticipated by prior art aviation fuels--for combustion in an automotive engine to minimize auto exhaust emissions is both highly novel and non-obvious over the prior art.

Although the RVP and/or distillation characteristics of aviation fuels are, as stated above, in some respects similar to the requirements of some of the fuels recited in the present claims, the reasons--the known reasons--aviation gasolines have their required RVP and distillation properties are unrelated to automotive operation. For example, the low RVP of aviation fuels (5.5 to 7.0 psi) is to control excessive vapor formation and prevent vapor lock which would otherwise occur at high altitudes--a problem singularly related to aircraft operation and unrelated to automobile operation. Thus, one of ordinary skill in the art, although knowing of the properties of aviation fuels, would have no reason to believe a benefit would pertain if those same properties were required in automotive gasoline, and certainly, there is nothing to suggest a benefit relating to auto emissions.

In any event, while applicants' attorney desires to

ensure that the Examiner is aware of the similarity in some properties between the fuels required in the claims and aviation fuels, the paramount fact to remember is that aviation fuels are designed for aircraft, not automobiles. The differences in the fuels stem largely from the difference in engines and operational environments: high altitude vs. ground transport, air-cooled vs. water cooled engines, and the need (in the case of autos) for unleaded, oxygenated fuels for environmental reasons, with the usual aviation fuel being both leaded and un-oxygenated, the latter to prevent destruction of seals, gaskets, and the like in aviation equipment. More detail relating to aviation gasolines in general can be found in **Exhibit O**, taken from Chapter 5, "Aviation Fuels," of the Manual on Significance of Tests for Petroleum Products: 5th Edition, George V. Dryoff, ed., published in 1989 by the ASTM, pp. 45-52; see most especially pages 49-51.

In addition, aviation gasolines are so different from automotive fuels that even the octane ratings are determined by different test procedures, with there being no one-to-one correlation between the (R+M)/2 octane determination for automotive fuels and that for aviation fuels.

Thus, for the foregoing reasons, it is submitted that the data in Attachments M and N pertaining to aviation gasolines in no way, either by themselves or in proper combination (if possible) with any prior art of record, teach or suggest the invention presently claimed.

Section D

Attachment A of IDS No. 3 sets forth a computerized listing of all gasoline data found in the publications submitted with IDS No. 3, Section A, in which the RVP was less than 7.0 psi

and the T50 was no greater than 215° F. Importantly, Attachment A also listed the locations in the publications where the gasoline data could be found. Thus, Attachment A made a useful reference tool for quickly evaluating a lot of published gasoline data, as well as quickly finding the location of any particular gasoline in a document discussed in IDS No. 3, Section A.

This computerized data base has now been expanded, with the aim being to include the relevant properties of all unleaded gasoline compositions disclosed in all publications of record dated pre-1991 in which the RVP is no greater than 7.5 psi. In other words, whenever a pre-1991 publication (including those submitted herewith in IDS No. 4) set forth a table of gasoline properties with an RVP of 7.5 psi or less (regardless of T50 or any other property), the relevant properties were entered on the computer data base. The entire data base (a total of 293 lines of data each identified by an OBS number) is included herewith as Attachment P, the data being sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90. (Note: An extra, loose copy of Attachment P is also being provided for the convenience of the Examiner.)

It should be understood that the main reason applicants are providing Attachment P is to help the Examiner review and compare the gasoline data in the publications of record. Moreover, should the Examiner desire the data of Attachment P to be sorted differently, or to exclude certain data and then be sorted (for example, by excluding all data having a T90 > 315° F. and then sorted by increasing or decreasing RVP, T50, or T90), all she need do is call applicants' attorney at 714-577-1250, and if a sort can be done for what she desires, the information will then be FAXed to her.

(It should be noted that Attachment P contains some duplicate data. The reason for this is that two or more publications of record may have taught an identical fuel of RVP \leq 7.5 psi. With the exception of the duplicate data found in the many Burns patents of record (those fuels being reported in Attachment P but once), Attachment P reports the fuels of identical properties as many times as found in different publications.)

In addition, a number of miscellaneous points relative to Attachment P must be made: First, there is no admission by applicants that all data on Attachment P are necessarily **prior art** data. Nor is there any admission that every fuel on Attachment P is necessarily a **gasoline** fuel. And there is no admission that all the data are accurate. Some, of course, is inherently inaccurate, since the data in the original document are flawed or questionable. (For example, see OBS 291 on page P-12 of Attachment P, where the reported data for Fuel 8 in Table X of the publication "Reformulated Gasoline for Clean Air" by Boekhaus et al. would have a gasoline in which the sum of aromatics, paraffins, and olefins is substantially less than 100%.) Moreover, while every effort has been made to ensure accuracy in transposing data from the original publications to Attachment P, it stands to reason, with almost 300 lines of data entry, that some information may have been transposed incorrectly. In any and all cases where data on Attachment P are at odds with the original document, the data in the original document will, of course, necessarily prevail as what is taught therein.

Section E

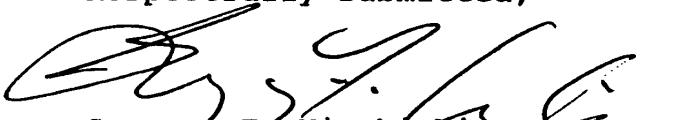
In the course of preparing the accompanying amendment, a review of previously submitted IDS No. 3 was made, and a few trivial and inconsequential errors were found. These errors

are:

(1) In IDS No. 3, Section B, on page 8, Fuel 364 of CRC 566 was identified as among those having an RVP between 7 and 8 psi and a T50 no greater than 215° F. In fact, Fuel 364 had an RVP of 8.1 psi and should not have been included as among fuels having a 7-8 psi RVP, and therefore, its inclusion on page 8 of Section B of IDS No. 3 was an error.

(2) In IDS No. 3, Section B, on page 9, one fuel in SAE 770811, Table A-1, was mis-identified as among those having an RVP between 7 and 8 and a T50 no greater than 215° F. Fuel F-9 had an RVP of 6.54 psi and a T50 of 215° F. and thus should not have been included in Section B. Instead, Fuel F-9 should have been reported in Section A of IDS No. 3 as among those having the properties of RVP < 7.0 psi and T50 ≤ 215° F. (See IDS No. 3, Section A, page 4.) In addition, in Section B, on page 9, other fuels in SAE 770811 should have been included among those having an RVP between 7 and 8 and a T50 no greater than 215° F., specifically, fuels F-1 and F-17 of Table A-1. However, now that all fuels in Table A-1 having an RVP of 7.5 psi or less (regardless of T50 or any other property) are included on the computer compilation (Attachment P, included herewith), any confusion generated by the errors with respect to the fuels of SAE 770811, Table A-1, should be resolved. All of the following fuels from Table A-1 are on said computer compilation: F-1, F-3, F-6, F-9, F-11, F-12, F-13, F-14, and F-18. (F-17 is not included since its RVP is greater than 7.5 psi.)

Respectfully submitted,



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714-577-1250

TUCSON AREA

UNLEADED REGULAR GASOLINE

SPEECHMAN 1976

| BAND | ACCO | EXXON | MOBIL | SHELL | STANDARD | TEXACO | UNION |
|--------------------|-------|-------|-------|-------|----------|--------|-------|
| API GRAVITY | 60.3 | 60.4 | 59.9 | 62.1 | 59.2 | 60.9 | 59.4 |
| IBP - 886 DIST. | 94 | 92 | 88 | 97 | 90 | 104 | 92 |
| 50 | 109 | 105 | 115 | 106 | 106 | 126 | 112 |
| 50X | 119 | 126 | 124 | 130 | 125 | 125 | 130 |
| 50X | 175 | 182 | 175 | 176 | 180 | 180 | 159 |
| 50X | 220 | 227 | 219 | 211 | 226 | 218 | 211 |
| 50X | 356 | 356 | 346 | 326 | 326 | 315 | 360 |
| END POINT | 410 | 440 | 424 | 404 | 434 | 406 | 393 |
| 50X | 363 | 398 | 382 | 343 | 392 | 349 | 375 |
| 90X | 337 | 356 | 346 | 326 | 326 | 315 | 375 |
| 90X | 37 | 37 | 37 | 37 | 37 | 37 | 7.5 |
| VAPOR PRESSURE | 6.9 | 6.9 | 6.4 | 6.9 | 6.9 | 6.9 | 6.9 |
| W.U.H. | 380 | 380 | 355 | 390 | 375 | 410 | 60.4 |
| LEAD, g/gal. | 0.000 | 0.000 | 0.012 | 0.012 | 0.006 | 0.000 | 0.000 |
| SLURRY, ppm | 233 | 481 | 579 | 66 | 549 | 202 | 576 |
| PHOSPHORUS, g/gal. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| MANGANESE, g/gal. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

ATTACHMENT J

BAKERSFIELD AREA
PREMIUM GASOLINE

SEPTEMBER 1976

| BRAND | ARCO | MOBIL | PHILLIPS | SHELL | STANDARD | TEXACO | UNION |
|--------------------|-------|-------|----------|-------|----------|--------|-------|
| API GRAVITY | 50.9 | 54.8 | 53.7 | 54.5 | 51.3 | 55.5 | 56.0 |
| IBP - 806 DIST. | 91 | 90 | 96 | 96 | 106 | 100 | 95 |
| 5% | 113 | 107 | 115 | 114 | 124 | 114 | 111 |
| 10% | 130 | 123 | 134 | 127 | 137 | 128 | 124 |
| 20% | 154 | 151 | 156 | 154 | 167 | 149 | 145 |
| 30% | 177 | 181 | 179 | 184 | 192 | 175 | 171 |
| 50% | 227 | 236 | 222 | 241 | 234 | 229 | 224 |
| 70% | 274 | 287 | 260 | 293 | 280 | 295 | 283 |
| 90% | 340 | 354 | 316 | 357 | 332 | 352 | 354 |
| 95% | 368 | 380 | 368 | 384 | 354 | 376 | 383 |
| END POINT | 409 | 418 | 410 | 430 | 408 | 430 | 424 |
| W.I.N. | 387 | 400 | 376 | 409 | 398 | 397 | 391 |
| VAPOR PRESSURE | 8.3 | 8.6 | 7.4 | 8.5 | 8.4 | 8.9 | 8.7 |
| LEAD, g/gal. | 3.72 | 3.05 | 3.24 | 3.11 | 2.60 | 3.31 | 3.47 |
| SULPHUR, ppm | 15 | 122 | 124 | 66 | 24 | 82 | 116 |
| PHOSPHORUS, g/gal. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

BAKERSFIELD
UNLEADED GASOLINE

SEPTEMBER 1981

| <u>Brand</u> | <u>ARCO</u> | <u>CHEVRON</u> | <u>MOBIL</u> | <u>SHELL</u> | <u>TEXACO</u> | <u>UNION</u> |
|------------------------|-------------|----------------|--------------|--------------|---------------|--------------|
| API Gravity @ 60°F | 49.9 | 52.4 | 54.9 | 55.5 | 53.2 | 56.1 |
| 086 Dist. - IBP | 92 | 94 | 88 | 88 | 92 | 98 |
| 5% | 110 | 116 | 109 | 107 | 108 | 119 |
| 10% | 131 | 135 | 126 | 120 | 123 | 140 |
| 20% | 162 | 159 | 146 | 142 | 153 | 143 |
| 30% | 188 | 183 | 164 | 166 | 182 | 187 |
| 50% | 243 | 226 | 215 | 215 | 233 | 224 |
| 70% | 290 | 275 | 273 | 276 | 281 | 263 |
| 90% | 336 | 334 | 327 | 351 | 338 | 335 |
| 95% | 374 | 363 | 369 | 377 | 369 | 365 |
| End Point | 405 | 405 | 408 | 406 | 404 | 415 |
| W.U.N. | 420 | 404 | 386 | 392 | 407 | 404 |
| F.I.A. % A | 47.0 | 42.0 | 39.5 | 34.5 | 42.5 | 34.0 |
| % 0 | 0.5 | 0.5 | 5.5 | 9.5 | 3.5 | 2.5 |
| % S | 52.5 | 57.5 | 55.0 | 56.0 | 54.0 | 63.5 |
| Vapor Pressure, psi | 8.4 | 8.3 | 8.0 | 7.9 | 8.9 | 7.5 |
| Lead, g/gal | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Sulfur, ppm | 24 | 8 | 305 | 324 | 395 | 141 |
| T V/L Ratio @ 20:1, °F | 155.0 | 146.3 | 144.2 | 146.9 | 141.5 | 151.4 |
| Research Octane | 92.5 | 92.4 | 92.7 | 92.6 | 92.2 | 95.9 |
| Motor Octane | 82.8 | 83.1 | 83.0 | 82.9 | 82.7 | 86.4 |
| Oleylamine, #/MB | | | | | | 7.5 |

BAKERSFIELD

SEPTEMBER 1981

| Brand | PREMIUM GASOLINE | | | | | | UNION |
|------------------------|------------------|----------|----------|----------|----------|----------|--------|
| | ARCO | CHEVRON | MOBIL | SHELL | TEXACO | | |
| Type | Unleaded | Unleaded | Unleaded | Unleaded | Unleaded | Unleaded | Leaded |
| API Gravity @ 60°F | 47.8 | 55.2 | 55.3 | 55.2 | 50.5 | 56.5 | |
| D86 Dist. - IBP | 86 | 92 | 92 | 91 | 87 | 92 | |
| 5% | 106 | 110 | 120 | 115 | 114 | 114 | |
| 10% | 123 | 132 | 139 | 133 | 134 | 127 | |
| 20% | 153 | 172 | 165 | 160 | 164 | 146 | |
| 30% | 182 | 192 | 190 | 186 | 192 | 165 | |
| 50% | 242 | 229 | 225 | 223 | 238 | 214 | |
| 70% | 292 | 265 | 264 | 268 | 285 | 272 | |
| 90% | 351 | 318 | 335 | 334 | 340 | 336 | |
| 95% | 381 | 353 | 363 | 369 | 389 | 362 | |
| End Point | 438 | 413 | 422 | 404 | 424 | 413 | |
| W.U.N. | 420 | 400 | 405 | 400 | 417 | 389 | |
| F.I.A. % A | 54.5 | 36.0 | 36.0 | 37.0 | 47.5 | 33.5 | |
| % 0 | 0.5 | 9.0 | 2.5 | 4.5 | 3.0 | 9.5 | |
| % S | 45.0 | 55.0 | 61.5 | 58.5 | 49.5 | 57.0 | |
| Vapor Pressure, psi | 7.9 | 7.0 | 7.6 | 8.4 | 8.0 | 7.9 | |
| Lead, g/gal | <0.001 | 0.13 | <0.001 | <0.001 | <0.001 | 2.18 | |
| Sulfur, ppm | 15 | 71 | 114 | 189 | 25. | 1060 | |
| T V/L Ratio @ 20:1, °F | 150.5 | 149.0 | 152.8 | 149.7 | 149.7 | 143.2 | |
| Research Octane | 97.0 | 96.4 | 96.3 | 96.7 | 96.7 | 96.6 | |
| Motor Octane | 86.0 | 85.7 | 86.3 | 86.2 | 85.6 | 86.7 | |
| Oleyamine, #/MB | | | | | ----- | 14.9 | |

SUPER 76 GASOLINE

ATTACHMENT K

K-I

DIST. INVENTORY, GRWTH, SUPPLY, PROCS, ENGRG, ACCOUNTING, SUPT, BULK OPER, LABORATORY &

SUPER 16 GASOLINE

| BLEND NUMBER | SPEC SHEET 1 | 354 | 357 | 362 | 367 | 350 | 355 | 359 | 361 | 363 | 365 |
|-----------------------------|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| TANK NUMBER | 6-2-6-16-4 | 6510 | 652 | 6120 | 6110 | 610 | 610 | 612 | 612 | 612 | 610 |
| SAMPLE NUMBER | 4014 | 6047 | 4101 | 6113 | 4200 | 6271 | 4292 | 4355 | 4355 | 4355 | 4355 |
| DATE BLEND COMPLETED | 06/26/62 | 06/26/62 | 10/03/62 | 10/07/62 | 10/10/62 | 10/15/62 | 10/16/62 | 10/21/62 | 10/26/62 | 10/26/62 | 10/26/62 |
| BARRELS BLENDED | 1-6-81 | 73.5 | 60.9 | 76.3 | 70.6 | 76.4 | 70.3 | 70.4 | 60.9 | 60.9 | 63.1 |
| GRADE | | H | H | H | H | H | H | H | H | H | H |
| UNLEADED GAS/C4 | | 9.02 | 10.11 | 32.70 | 32.80 | 19.70 | 39.15 | 19.72 | 34.01 | 34.01 | 34.01 |
| UNISON LT CAT GASO | | 4.65 | 16.26 | 12.92 | 12.03 | 15.06 | 7.06 | | | | |
| CHAMPLIN REFORMATE | | | | | | | | | | | |
| U110 LT CAT GASO | | | | | | | | | | | |
| BLENDING BUTANE | | | | | | | | | | | |
| U120 LT UNICRACKATE | | | | | | | | | | | |
| U60 REFORMATE | | | | | | | | | | | |
| U60 UNIF HTW CAT GASO | | | | | | | | | | | |
| U100 REFORMATE | | | | | | | | | | | |
| U100 REFORMATE | | | | | | | | | | | |
| GRAVITY API 60 F. | | | | | | | | | | | |
| YARD PRESS RECD | | | | | | | | | | | |
| SPEC/RESULT 1 | | | | | | | | | | | |
| SPEC/RESULT 1 | | | | | | | | | | | |
| 30 DAY AVERAGE | | | | | | | | | | | |
| Y/L RATIO | | | | | | | | | | | |
| 30 DAY AVERAGE | | | | | | | | | | | |
| GUMS EXISTENT MG/100 ML | | | | | | | | | | | |
| ISO RATING | | | | | | | | | | | |
| 100 MAX | | | | | | | | | | | |
| BLENDING 8100 MINUTES | | | | | | | | | | | |
| BRUMMINE NUMBER 6/1006 | | | | | | | | | | | |
| 20 MAX | | | | | | | | | | | |
| SULFUR WEIGHT PCT | | | | | | | | | | | |
| MERCAPTAN SULFUR PPM | | | | | | | | | | | |
| LEAD CONT TOTAL S/66AL CALC | | | | | | | | | | | |
| OCTANE NO (R90)/2 | | | | | | | | | | | |
| 30 DAY AVERAGE | | | | | | | | | | | |
| 92.0/92.2 MIN | | | | | | | | | | | |
| 92.0/92.2 MIN | | | | | | | | | | | |
| RECOVERY VOL PCT | | | | | | | | | | | |
| RECOVERY VOL PCT | | | | | | | | | | | |
| ATRITION VOL PCT | | | | | | | | | | | |
| EP 30 DAY AVERAGE | | | | | | | | | | | |
| 930 MAX | | | | | | | | | | | |
| 101 EVAP DEGREES F | | | | | | | | | | | |
| 170 MIN SPEC. MAX | | | | | | | | | | | |
| 592 EVAP DEGREES F | | | | | | | | | | | |
| 901 EVAP DEGREES F | | | | | | | | | | | |
| SPEC/RESULT 1 | | | | | | | | | | | |
| WARM UP NUMBER | | | | | | | | | | | |
| 30 DAY AVERAGE | | | | | | | | | | | |

1. APPLIES TO W AND ML GRADES ONLY
 2. SUPER MAC ARE 92.0. SUPER W 19 92.2.
 3. DOES NOT APPLY 10 C GRADE.

MIGULAH 7b GASOLINI

| | | | | | | | | | |
|-----------------------|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| BLEND NUMBER | SPFC SHUTTLE | 104 | 104 | 111 | 115 | 116 | 117 | 118 | 120 |
| TANK NUMBER | 6-9 | 11701 | 126 | 140 | 1534 | 1524 | 1542 | 1512 | 1516 |
| DATE BLEND COMPLETED | 02-15-70 | 118-04-00 | 118-04-00 | 118-04-00 | 118-04-00 | 118-04-00 | 118-04-00 | 118-04-00 | 118-04-00 |
| BARRELS ALUMINUM | 02-15-70 | 48.4 | 43.0 | 14.0 | 15.8 | 15.6 | 15.6 | 15.6 | 15.6 |
| GRADE | UNIFINED CG/C6 | 14.94 | 14.94 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 |
| UNISOL LT CAT GASO | 25.91 | 10.94 | 11.94 | 12.84 | 12.84 | 12.84 | 12.84 | 12.84 | 12.84 |
| UGO REFORMATE | 45.47 | 12.5 | 41.67 | 20.74 | 19.02 | 9.07 | 1.55 | 11.14 | 22.14 |
| BLENDING BUTANE | 11.21 | 2.46 | 4.41 | 4.03 | 2.95 | 1.76 | 1.91 | 2.01 | 3.11 |
| UG20 LT UNICRACKATE | 15.29 | 3.01 | 7.21 | 20.34 | 20.34 | 35.07 | 27.56 | 9.11 | 9.11 |
| UGO REFORMATE | 10.9 | 2.93 | 3.01 | 21.07 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 |
| MOTOR ALK | 25.5 | 13.55 | 13.55 | 2.11 | 2.11 | 2.11 | 2.11 | 2.11 | 2.11 |
| UG100 REFORMATE | 14.94 | 13.17 | 11.53 | 26.39 | 11.53 | 11.53 | 11.53 | 11.53 | 11.53 |
| GRAVITY API 60 F | 57.0 | 60.9 | 55.5 | 17.27 | 17.27 | 17.27 | 17.27 | 17.27 | 17.27 |
| VAPOR PRESS RETD | 1380120 | 9001055 | 9001055 | 9001055 | 9001055 | 9001055 | 9001055 | 9001055 | 9001055 |
| SPEC/RESULT | 135M12N | 90M12N |
| Y/RATIO | 30 DAY AVERAGE | 22 MAX |
| 30 DAY AVERAGE | 200 MIN | 510 | 960 | 360 | 360 | 360 | 360 | 360 | 360 |
| 30 DAY AVERAGE | 200 MAX | 200 MAX | 200 MAX | 200 MAX | 200 MAX | 200 MAX | 200 MAX | 200 MAX | 200 MAX |
| ORIATION STAB MINUTES | 14 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| BRONIME NUMBER 6/1006 | 510 | 960 | 360 | 360 | 360 | 360 | 360 | 360 | 360 |
| SULFUR PPM | 207 | 211 | 211 | 25 | 23 | 3 | 2 | 1 | 2 |
| MERCAPTAN SULFUR, PPM | 307 | 242 | 410 | 231 | 275 | 410 | 254 | 254 | 254 |
| LEAD, MG/GAL | 1.5 | 0.9 | 1.7 | 1.3 | 1.5 | 0.9 | 1.0 | 0.0 | 0.1 |
| LEAD, MG/GAL (TANK) | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX |
| MOTOR OCTANE | 89.0 MIN | 89.0 MIN | 89.0 MIN | 89.0 MIN | 89.0 MIN | 89.0 MIN | 89.0 MIN | 89.0 MIN | 89.0 MIN |
| 30 DAY AVERAGE | 84.0 MIN | 84.0 MIN | 84.0 MIN | 84.0 MIN | 84.0 MIN | 84.0 MIN | 84.0 MIN | 84.0 MIN | 84.0 MIN |
| OCTANE NO (R+M)/2 | 89.35 | 89.17 | 89.14 | 89.56 | 89.20 | 89.15 | 89.36 | 89.44 | 89.44 |
| 30 DAY AVERAGE | 88.0 MIN | 88.0 MIN | 88.0 MIN | 88.0 MIN | 88.0 MIN | 88.0 MIN | 88.0 MIN | 88.0 MIN | 88.0 MIN |
| EP. DEGREES F | 032 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX | 0.02 MAX |
| RECOVERY VOL PCT | 95.0 MIN | 92.7 | 430 | 915 | 569 | 402 | 915 | 915 | 915 |
| RECOVERY VOL PCT | 2.0 MAX | 95.0 | 97.0 | 96.0 | 96.0 | 96.0 | 97.0 | 97.5 | 97.5 |
| EP 30 DAY AVERAGE | 83.0 MAX | 82.7 | 907 | 913 | 913 | 913 | 913 | 913 | 913 |
| 102 EVAP DEGREES F | 138M101 | 138M124 | 138M132 | 1400M132 | 1400M132 | 1400M135 | 1400M135 | 1400M135 | 1400M135 |
| 902 EVAP DEGREES F | 218M211 | 203M205 | 204M222 | 243M197 | 243M197 | 243M217 | 243M217 | 243M217 | 243M217 |
| WARM UP NUMBER | 365M126 | 365M131 | 365M134 | 365M130 | 365M130 | 365M125 | 365M125 | 365M125 | 365M125 |
| 30 DAY AVERAGE | 374 | 374 | 417 | 397 | 397 | 390 | 390 | 390 | 390 |
| RESULT | 374 | 391 | 405 | 394 | 394 | 394 | 394 | 394 | 394 |

1. APPLIES TO M AND NL GRADES ONLY
2. DOES NOT APPLY TO C GRADE

DISTRIIBUTION - GEN. SUP. OPER., SURV. PROC. ENGRG., SUPT., R.0.0., ALMEN. FOREMAN, BLEND ENGR., LABORATORY, 2

REG 76 GASO (UNLEADED)

| | | | | | | | | | | |
|---|-------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|
| TANK NUMBER | SPEC SHEET | 8204 | 378 | 8100514 | 8100542 | 8100512 | 8-204 | 8100540 | 8100542 | 8100512 |
| SAMPLE NUMBER | 6-8 | 1509 | 1520 | 1509 | 1609 | 1647 | 1748 | 1772 | 1823 | 1834 |
| DATE BLEND COMPLETED | DATED | 02-26-75 | 03-02-75 | 03-04-75 | 03-06-75 | 03-09-75 | 03-12-75 | 03-13-75 | 03-16-75 | 03-19-75 |
| BARRELS BLENDED | GRADE | 69.2 | 39.6 | 59.6 | 74.5 | 39.8 | 65.0 | 69.7 | 66.4 | 64.0 |
| U80 UNREFINED C5/C6 | C | 1 | ML | H | ML | C | H | ML | ML | ML |
| UNISOL LT CAT GASO | | 25.20 | 5.9 | 27.67 | 25.26 | 5.64 | 11.98 | | | |
| U33 AVIA BASE STOCK | | | 7.48 | | | 9.15 | | | | |
| U80 REFORMATE | | 55.40 | 22.59 | 22.39 | 12.16 | 29.94 | | 5.42 | 24.05 | |
| U91 ICS | | 14.55 | 16.40 | 5.01 | 3.46 | 16.75 | 12.24 | 4.57 | 9.86 | 32.16 |
| BLENDING BUTANE | | | 10.20 | 1.92 | 6.89 | 11.32 | 2.66 | 2.72 | 7.08 | |
| U120 LT UNICRACKATE | | | 7.95 | 1.93 | 2.71 | | | | | 2.48 |
| U60 UNIF HVY CAT GASO | | 3.31 | 5.36 | 0.58 | 1.50 | 4.72 | 4.98 | 1.27 | | |
| U-110 MOTOR ALKY | | 1.51 | | | | | | | | |
| U100 REFORMATE | | | 26.53 | 42.39 | 52.95 | 26.86 | 59.45 | 1.92 | 3.67 | 1.12 |
| GRAVITY API | 60F | 86.6 | 57.9 | 52.9 | 52.2 | 56.0 | 56.2 | 59.8 | 53.7 | 55.4 |
| CORROSION 3 HOURS 122F | 1 MAXIMUM | | | | | | | | | |
| VAPOR PRESS RE10 LBS | SPEC/RESULT | 140PX134 | 123MX122 | 93MX85 | 93MX76 | 129MX116 | 145MX131 | 93MX84 | 93MX91 | 93MX84 |
| V/L RATIO | 22 MAX | 112116 | 124125 | 12211 | 130110 | 122120 | 112117 | 130174 | 12213 | 12211 |
| 30 DAY AVERAGE | 20 MAX | 20 | 19 | 8 | 14 | 9 | 16 | 11 | 5 | 5 |
| GUNS SOL WASHED MG/100 ML ² 0.00 MAX | | 0.2 | | | | | | | | |
| GUNS ISO MG/LITER | | 3.3 | | | | | | | | |
| ISO RATING | 100 MAX | | | | | | | | | |
| OXIDATION STAB MINUTES | 100 MAX | 240 MIN | | 59 | 21 | 40+ | | | | |
| OIAZO NUMBER | 65 MAX | 7 | | | | | | | | |
| BRONINE NUMBER 6/1006 | 26 MAX | 38 | | | | | | | | |
| SULFUR WEIGHT PCT | 0.15 MAX | | 0.01 | | | | | | | |
| MERCAPTAN SULFUR PPM | 6.0 MAX | 0.9 | 1.1 | 1.3 | 1.2 | 1.3 | 0.5 | 1.1 | 1.0 | 1.2 |
| LEAD, GR/GAL | 0.02 MAX | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.007 | 0.005 | 0.005 | 0.005 |
| ROAD RATING CALC | | | | | | | | | | |
| 30 DAY AVERAGE | 91.2 MIN | 91.57 | 91.73 | 91.50 | 91.52 | 91.58 | 91.48 | 91.59 | 91.51 | 91.52 |
| OCTANE NO. (R+M)/2 | 91.5 MIN | 91.51 | 91.58 | 91.52 | 91.54 | 91.52 | 91.55 | 91.55 | 91.53 | 91.55 |
| 30 DAY AVERAGE | 88.5 MIN | 90.85 | 90.28 | 91.20 | 91.13 | 90.21 | 89.57 | 90.54 | 90.64 | 90.63 |
| MAX DEGREES F | 69 MIN | 89.86 | 90.39 | 90.25 | 90.56 | 90.35 | 90.10 | 90.54 | 90.62 | 90.68 |
| RECOVERY PCT | 932 MAX | 422 | 426 | 376 | 391 | 432 | 432 | 379 | 413 | 381 |
| RESIDUE PCT | 95 MIN | 28 | 95.0 | 97.0 | 97.5 | 97.0 | 97.0 | 97.0 | 97.0 | 98.0 |
| MAX DEGREES F - 30 DAY AVE 430 MAX | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| 10PCT EVAPORATED DEG F | SPEC/RESULT | 1400PX97 | 1500PX116 | 1500PX133 | 1500PX136 | 1500PX108 | 1500PX132 | 1500PX123 | 1500PX130 | 404 |
| PCT EVAP AT 180F | | 36.5 | 35.0 | 32.0 | 31 | 38.5 | 92.0 | 34.0 | 37.5 | 33.5 |
| PCT EVAP AT 210F | | 45.5 | 45.0 | 46.0 | 45 | 48.0 | 53.0 | 52.0 | 49.5 | 46.5 |
| PCT EVAP AT 250F | | 61.0 | 65.0 | 66.5 | 67 | 65.0 | 73.0 | 76.0 | 67.5 | 67.0 |
| PCT EVAP AT 300F | 70 MIN | 62 | 66 | 90 | 90 | 64 | 90 | 93 | 88 | 89 |
| WARM UP FACTOR | | 143 | 146 | 144 | 143 | 152 | 168 | 164 | 154 | 147 |
| 30 DAY AVERAGE | | 140-185 | 151 | 148 | 142 | 144 | 142 | 152 | 148 | 145 |

2. DOES NOT APPLY TO C GRADE
 3. APPLIES TO H AND ML GRADES ONLY
 4. MAX 446 APPLIES TO 1 GRADE ONLY

REF 76 GASO (LOW-LEAD)

| TANK NUMBER | SPEC SHEET | B-100510 | 0-100538 | 0-100536 | B-100522 | 0-100524 | B-100538 | B-100522 | B-376 |
|---|------------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| SAMPLE NUMBER | 0-4 | 2024 | 2059 | 2154 | 2222 | 2264 | 2287 | 2296 | 100536 |
| DATE BLEND COMPLETED | 07/01/72 | 02-20-73 | 02-21-73 | 02-25-73 | 02-27-73 | 03-01-73 | 03-04-73 | 03-05-73 | 2356 |
| BARRELS BLENDED | | 34.6 | 34.6 | 29.6 | 54.3 | 34.6 | 59.2 | 29.7 | 03-07-73 |
| GRAUL | | ML | H | ML | ML | H | ML | H | 39.6 |
| U90 UNIFINED CS/C6 | | 10.89 | 1.47 | 1.07 | 0.46 | 9.68 | 21.49 | 1.1 | ML |
| U1101 LT CAT GASO | | 22.22 | 19.24 | 13.62 | 14.50 | 22.75 | 13.40 | 23.74 | 9.96 |
| U53 AVIA BASE STOCK | | 9.61 | | | | 7.93 | | 6.16 | 26.75 |
| MLB ALAY GASO | | | | | | | | | |
| BLENDING RUTAIE | | | | | | | | | |
| U120 LT UNICRACKATE | | 2.22 | 3.99 | 8.86 | 9.16 | 9.30 | 9.64 | 7.46 | 0.37 |
| U60 MILDFINATE | | 31.48 | 33.48 | 33.67 | 30.91 | 27.93 | 19.59 | | |
| U60 WILF IVY CAT GASO | | 21.04 | 37.29 | 35.61 | 35.09 | 35.58 | 21.43 | 41.62 | 21.76 |
| U-110 MOTOR ALKY | | 3.32 | 2.08 | 3.40 | 3.38 | 3.41 | 0.99 | 1.02 | 21.52 |
| U110 ICN | | 9.14 | 11.77 | 3.51 | 3.76 | 5.81 | 19.44 | 9.85 | 2.73 |
| GRAVITY API 60F | | 4.39 | 5.08 | | | | | | 16.86 |
| CORISION 3 HOURS 122F 1 MAXIMUM | | 63.9 | 59.4 | 59.9 | 60.6 | 60.8 | 63.3 | 60.1 | 66.4 |
| VAPOR PRESS 100F PSI SPLC/RESULT | | 140MMX116 | 124MMX120 | 129MMX116 | 129MMX117 | 129MMX115 | 90MMX70 | 129MMX117 | 118MMX109 |
| V/L RATIO | | 22 MAX | 110/21 | 120/10 | 122/18 | 122/20 | 122/16 | 130/12 | 122/20 |
| 30 DAY AVERAGE | | 20 MAX | 20 | 8 | 19 | 19 | 7 | 20 | 17 |
| GUNS SOLV WASHED MG/100 ML _{4.0} MAX | | | | | | | | | 17 |
| GUNS 150 MG/LITER | | | | | | | | | |
| TSU RATING | | 100 MAX | | | | | | | |
| OXIDATION STAB MINUTES | | 240 MIN | | | | | | | |
| DIAZO NUMBER | | 45 MAX | | | | | | | |
| HALITIALIES FIM VOL PCT | | | | | | | | | |
| INOMIN'L NUMBER G/100G | | 26 MAX | | | | | | | |
| SULFUR WEIGHT PCT | | 0.15 MAX | | | | | | | |
| MURCRITAI, SULFUR PPM | | 6.0 MAX | 1.9 | 1.6 | 0.9 | 0.02 | | | |
| TLL E/GAL CALCULATED | | 0.60MAX | 3* | 0.54 | 0.53 | 1.3 | 2.4 | 2.1 | 1.3 |
| KH MUTUN INT COMP RESULT | | 65.52 | 65.82 | 65.66 | 65.54 | 0.54 | 0.55 | 0.55 | 0.49 |
| KH RLESTACH INT COMP RES | | 93.5 MIN 1* | 93.99 | 93.93 | 93.76 | 93.85 | 05.53 | 05.48 | 05.42 |
| 30 DAY AVERAGE | | 93.6 MIN 1* | 93.84 | 94.07 | 93.85 | 93.83 | 93.70 | 93.47 | 93.93 |
| ROAD RATING CALC | | 91.4 MIN 4* | 91.00 | 91.72 | 91.90 | 91.81 | 93.98 | 93.81 | 92.34 |
| 30 DAY AVERAGE | | 91.7 MIN 4* | 92.06 | 91.74 | 92.05 | 92.01 | 91.80 | 91.76 | 93.82 |
| MAX LENGTHS F | | 432 MAX | 910 | 9011 | 417 | 421 | 91.77 | 91.96 | 91.54 |
| RECOVERY PCT | | 95 MIN 2* | 96.0 | 95.5 | 96.0 | 97.0 | 91.5 | 403 | 400 |
| RESIDUE PCT | | 2.0 MAX | 1.0 | 1.2 | 1.0 | 1.0 | 98.0 | 97.0 | 97.5 |
| MAX DEGREES F - 30 DAY AVE 30 MAX | | 417 | 909 | 417 | 917 | 918 | 1.0 | 1.0 | 1.0 |
| 10PCT EVAPORATED DEG F | | SPEC/RESULT | 140MMX108 | 140MMX111 | 140MMX109 | 150MMX106 | 150MMX112 | 150MMX136 | 150MMX106 |
| PCT EVAP AT 160F | | 99.5 | 36.0 | 43 | 92.0 | 91.0 | 92.0 | 40.0 | 49.0 |
| PCT EVAP AT 210F | | 63 | 97.0 | 52 | 52.0 | 52.0 | 59.5 | 60.0 | 46.5 |
| PCT EVAP AT 250F | | 76 | 60.0 | 63 | 63.5 | 65.0 | 67.0 | 62.0 | 60.5 |
| PCT EVAP AT 300F | | 84 | 74.0 | 79 | 79 | 77 | 87 | 75 | 74.5 |
| WARM UP FACTOR | | 135-190 | 143 | 150 | 150 | 150 | 176 | 86 | 85 |
| 30 DAY AVERAGE | | 140-185 | 159 | 159 | 160 | 160 | 163 | 152 | 162 |
| | | | | | | | | 160 | 178 |
| | | | | | | | | | 164 |

1* NO RESEARCH SPEC. FOR 1 GRADE

2* DOES NOT APPLY TO C GRADE

3* GRAUE SPEC. 0.5 MAX. TI-607, 9-20-72

4* SHELL CHARGE PER LETTER B-229, 11-14-72

REGULAR 76 GASOLINE

| | | | | | | | | | | |
|---------------------------------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| TANK NUMBER | SPEC SHEET | R-378 | 8-100522 | 8-100536 | 8-60001 | 8-100524 | 8384/385 | 8-100538 | 8-100524 | 8-100510 |
| SAMPLE NUMBER | C-4 | 1818 | 1832 | 1840 | 1923 | 1964 | 3035 | 3096 | 3223 | |
| DATE BLEND COMPLETED | DATED | 02-10-72 | 02-12-72 | 02-13-72 | 02-17-72 | 02-20-72 | 02-22-72 | 02-25-72 | 02-27-72 | 03-01-72 |
| BARRELS BLENDED | 09/29/71 | 24.7 | 24.7 | 29.6 | 49.5 | 24.7 | 34.5 | 74.2 | 69.2 | 44.4 |
| GRADE | | 1 | PL | ML | H | ML | C | H | ML | ML |
| U80 UNIFINED CS/C6 | | 22.50 | 8.51 | 6.89 | | | | | | |
| UNISOL LT CAT GASO | | 18.63 | 19.75 | 20.39 | 23.29 | 22.17 | 24.38 | 21.23 | 20.53 | 23.80 |
| U33 AVIA BASE STOCK | | 9.42 | 8.14 | 5.62 | 1.01 | | | 11.43 | 8.51 | 6.18 |
| U80 REFORINATE | | 1504 | 4.69 | | | | | | | |
| U91 IC5 | | 2.25 | 2.98 | 2.98 | | | | | | |
| MLG ALKY GASO | | 5.24 | | | | | | | | |
| BLENDING BUTANE | | 0.79 | 4.78 | 5.42 | | | | | | |
| U120 LT MICRACKATE | | 4.39 | 4.87 | 15.91 | 22.22 | 19.59 | 10.59 | | | |
| U60 REFORINATE | | 28.65 | 30.99 | 31.72 | 29.18 | 31.60 | 38.49 | 27.29 | 33.31 | 36.57 |
| U80 UNIF MVY CAT GASO | | 5.58 | 6.02 | 6.26 | 7.34 | 7.14 | 5.52 | 6.45 | 4.75 | 5.06 |
| U-110 MOTOR ALKY, | | 6.24 | | 6.77 | 17.60 | 13.11 | | | | |
| BUTANE-BUTENE | | | | 3.42 | 1.01 | 1.84 | | | | |
| U110 IC4 | | | 2.78 | 2.98 | | | | 2.77 | 2.05 | 14.70 |
| GRAVITY API 60F | | 58.2 | 58.9 | 59.0 | 58.8 | 58.2 | 59.3 | 58.2 | 58.7 | 57.2 |
| CORROSION 3 HOURS 122F 1 MAXIMUM | | 121MMX115 | 141MMX126 | 141MMX129 | 8011X76 | 90MMX84 | 145MMX140 | 8011X75 | 90MMX90 | 90MMX94 |
| VAPOR PRESS PC10 1COF PSI SPEC/RESULT | | 124119 | 110110 | 110116 | 130111 | 122110 | 112120 | 130111 | 122111 | 122111 |
| V/L RATIO | | 22 | MAX | | | | | | | |
| 30 DAY AVERAGE | | 20 | MAX | 19 | 19 | 17 | | 13 | 11 | 9 |
| GUMS 150 MG/LITER | | | | | | 1.2 | | | | 0.2 |
| GR. 5 150 MG/LITER | | | | | | | | | | 2.2 |
| 30 DAY AVERAGE | | 100 | MAX | | | | | | | |
| CONDENSATION STAB MINUTES | | 2.5 | MIN | | | | | | | |
| DIEDO NUMBER | | 4.5 | MAX | | | | | | | |
| PHENYLALDEHYDE STAB VOL PCT | | | | | | | | | | 4.5 |
| BROMINE NUMBER C/100G | | 20 | MAX | | | | | | | 0.7 |
| SULFUR WEIGHT PCT | | 0.15 | MAX | | | | | | | 2.2 |
| HF CAPTAIN SULFUR PPM | | 6.0 | MAX | | | | | | | 0.03 |
| TEL. CALCS CALCULATED | | 0.5 | MAX | 0.50 | 0.496 | 0.491 | 0.50 | 0.38 | 0.50 | 0.50 |
| KR. MOTOR INT COMP RESULT | | 85.49 | 85.41 | 85.43 | 85.39 | 85.44 | 85.07 | 85.42 | 85.42 | 85.46 |
| KR. RESEARCH INT COMP RES | | 93.5 | MIN | 94.08 | 94.20 | 94.46 | 94.37 | 94.43 | 94.56 | 94.50 |
| 30 DAY AVERAGE | | 93.8 | MIN | 94.54 | 94.56 | 94.55 | 94.52 | 94.49 | 94.47 | 94.39 |
| ROAD RATINGS CALC | | 91.9 | MIN | 92.27 | 92.21 | 92.20 | 92.23 | 179.63 | 92.22 | 92.25 |
| 30 DAY AVERAGE | | 92.2 | MIN | 92.25 | 92.25 | 92.24 | 92.24 | | 92.25 | 92.25 |
| HAT DEGREES F | | 432 | MAX | 427 | 419 | 417 | 427 | 430 | 422 | 424 |
| RECOVERY PCT | | 95 | MIN | 96.5 | 96.0 | 96.5 | 98.0 | 97.0 | 97.5 | 97.0 |
| RESIDUE PCT | | 2.0 | MAX | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MAX DEGREES F - 30 DAY AVE 60 MAX | | 426 | 425 | 425 | 425 | 425 | 425 | 425 | 425 | 425 |
| 10% T EVAPORATED DEG F SPEC/RESULT | | 140MMX105 | 140MMX107 | 140MMX109 | 150MMX135 | 150MMX130 | 150MMX97 | 150MMX141 | 147MMX129 | 147MMX130 |
| PCT EVAP AT 180F | | 40.0 | 38.0 | 40.0 | 32 | 35.0 | 40.5 | 30.5 | 33.0 | 30.0 |
| PCT EVAP AT 210F | | 48.0 | 49.0 | 49.5 | 44 | 47.5 | 48.5 | 45.5 | 45.0 | 41.5 |
| PCT EVAP AT 250F | | 59.0 | 61.0 | 61.5 | 62 | 62.0 | 58.5 | 64.0 | 61.0 | 56.5 |
| PCT EVAP AT 300F | | 73 | 74 | 75 | 76 | 74 | 72 | 76 | 72 | 72 |
| WARM UP FACTOR | | 135-175 | 10 | 147 | 151 | 140 | 144 | 140 | 139 | 128-131 |
| 30 DAY AVERAGE | | 140-170 | 10 | 152 | 151 | 150 | 150 | 150 | 145 | 145 |

*1 VER TT-66, 2-3-72, MINIMUM HUF SPECS. REDUCED 5

*2 NUMBERS FOR PERIOD 3-1 TO 4-15-72

DISTRIBUTION- GEN SUPV OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER LABORATORY 2

REGULAR 76 GASOLINE 1012 1012 1005 1012 241 1012 1012

| BLEND NUMBER | 15 | 18 | 20 | 25 | 30 | 31 | 34 |
|-----------------|---------|---------|---------|---------|--------|--------|---------|
| STAB. NUMBER | 1012 | 1012 | 1005 | 1012 | 241 | 1012 | 1012 |
| DATE COMPLETED | 2-12-71 | 2-15-71 | 2-20-71 | 2-27-71 | 3-6-71 | 3-7-71 | 3-11-71 |
| BARRELS BLENDED | 48414. | 58652. | 72969. | 38622. | 29329. | 24343. | 53398. |
| GRADE OF BLEND | LC | LC | LW | LC | LW | LC | LC |
| V/L TEMPERATURE | 112. | 112. | 112. | 112. | 122. | 112. | 112. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|-------|-------|-------|------|------|------|-------|
| LAR LT. CAT | 13.7 | 15.3 | 11.3 | 11.9 | 0.0 | 21.7 | 25.7 |
| LT. WAXY GASO. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| C3-C6 | 20.1 | 23.4 | 25.1 | 23.3 | 33.1 | 23.2 | 23.0 |
| L.S.T.P. | 49.9 | 46.1 | 49.4 | 50.1 | 48.7 | 46.7 | 45.0 |
| BUTANE | 8.0 | 8.2 | 7.6 | 3.3 | 0.0 | 3.4 | 3.0 |
| LUK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| H.S.T.P. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ALKYLATE | 8.3 | 7.0 | 6.6 | 6.3 | 18.1 | 4.9 | 3.3 |
| TOTAL | 100.0 | 100.0 | 100.0 | 99.9 | 99.9 | 99.9 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 60.2 | 60.5 | 60.1 | 59.9 | 58.3 | 59.7 | 59.1 |
| R.V.P. | 12.5 | 12.7 | 12.0 | 11.7 | 7.2 | 10.7 | 9.5 |
| V/L RATIO | 8.8 | 9.7 | 6.8 | 4.4 | 0.2 | 5.4 | 0.3 |
| 30 DAY AVE | 4.6 | 6.4 | 6.5 | 7.5 | 6.7 | 6.6 | 5.5 |
| 10 PCT. POINT | 104.0 | 103.0 | 104.0 | 107.0 | 129.0 | 113.0 | 112.0 |
| MAX DEG. F. BLEND | 412.0 | 400.0 | 404.0 | 409.0 | 428.0 | 418.0 | 418.0 |
| 30 DAY AVE | 416.2 | 412.7 | 410.5 | 405.5 | 408.2 | 409.1 | 410.5 |
| N.U.F. BLEND | 152.8 | 164.2 | 165.1 | 159.0 | 148.7 | 163.4 | 161.5 |
| 30 DAY AVE | 148.6 | 152.6 | 155.7 | 161.0 | 159.5 | 159.9 | 160.2 |
| EVAP. AT 300 F | 82.6 | 84.3 | 83.5 | 82.3 | 81.0 | 82.0 | 81.8 |
| RECOVERY PCT | 95.0 | 95.3 | 96.0 | 96.0 | 97.0 | 96.9 | 96.2 |
| RESIDUE PCT | 1.3 | 1.3 | 1.5 | 1.5 | 1.4 | 1.4 | 1.5 |
| RSH PPM | 2.000 | 1.600 | 1.800 | 1.900 | 1.400 | 2.100 | 2.600 |
| 30 DAY AVE | 1.827 | 1.892 | 1.869 | 1.808 | 1.760 | 1.790 | 1.923 |
| CURR. 3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 0.43 | 0.44 | 0.44 | 0.48 | 0.44 | 0.51 | 0.53 |
| KRR BLEND | 94.30 | 95.00 | 94.80 | 95.10 | 94.10 | 95.40 | 95.50 |
| 30 DAY AVE | 94.69 | 94.55 | 94.61 | 94.79 | 94.71 | 94.77 | 94.89 |
| KRM BLEND | 85.10 | 85.20 | 84.90 | 85.10 | 85.10 | 84.80 | 84.60 |
| ROAD OCT. BLEND | 92.70 | 93.00 | 92.70 | 92.90 | 92.60 | 92.90 | 92.80 |
| 30 DAY AVE | 92.98 | 92.88 | 92.84 | 92.81 | 92.79 | 92.80 | 92.80 |
| ID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS, EX. MG/100ML | 0.20 | 0.60 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| SULFUR | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.065 | 0.000 |

| SUPER 76 GASOLINE | | SAN FRANCISCO REFINERY | | PREVIOUS REPORT | | | |
|-------------------------|---------|------------------------|--------|-----------------|---------|---------|---------|
| BLEND NUMBER | 24 | 23 | 29 | 35 | 33 | 44 | 43A |
| TANK NUMBER | 243 | 242 | 1004 | 1004 | 1004 | 243 | 242 |
| DATE COMPLETED | 2-26-71 | 3-4-71 | 3-4-71 | 3-14-71 | 3-19-71 | 3-25-71 | 3-27-71 |
| BARRELS BLENDED | 24803. | 29566. | 19584. | 50719. | 44191. | 19703. | 42210. |
| GRADE OF BLEND | W | W | C | C | C | W | W |
| V/L TEMPERATURE | 122. | 122. | 112. | 122. | 112. | 122. | 122. |
| COMPOSITION (VOL. PCT.) | | | | | | | |
| LUK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LAR ALKYLATE | 4.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LAR REFORMATE | 7.2 | 7.7 | 9.1 | 8.5 | 9.1 | 11.4 | 6.9 |
| BUTANE | 6.8 | 0.0 | 6.1 | 6.4 | 5.0 | 0.9 | 2.0 |
| L.S.T.P. | 42.6 | 49.4 | 49.7 | 49.0 | 49.2 | 43.7 | 49.9 |
| C5-C6 | 9.6 | 0.0 | 10.0 | 9.2 | 10.4 | 0.0 | 0.0 |
| LT. WAXY GASO. | 10.3 | 14.3 | 11.2 | 12.9 | 11.5 | 12.5 | 15.1 |
| LT. CAT. | 18.8 | 29.5 | 13.9 | 13.9 | 13.8 | 26.5 | 26.1 |
| TOTAL | 99.9 | 100.0 | 100.0 | 99.9 | 100.0 | 100.0 | 100.0 |
| BLEND QUALITY | | | | | | | |
| GRAVITY API | 57.9 | 54.6 | 56.4 | 55.1 | 55.2 | 55.5 | 54.7 |
| R.V.P. | 11.2 | 7.5 | 10.3 | 9.8 | 10.6 | 3.5 | 8.3 |
| V/L RATIO | 13.8 | 0.2 | 6.2 | 7.6 | 1.2 | 1.1 | 0.3 |
| 30 DAY AVE | 9.1 | 8.0 | 7.9 | 8.6 | 7.4 | 6.9 | 6.0 |
| 10 PCT POINT | 107.0 | 132.0 | 115.0 | 116.0 | 115.0 | 123.0 | 127.0 |
| MAX DEG.F BLEND | 408.0 | 419.0 | 412.0 | 424.0 | 414.0 | 418.0 | 415.0 |
| 30 DAY AVE | 406.3 | 407.8 | 408.1 | 411.2 | 411.7 | 414.6 | 414.7 |
| W.U.F. BLEND | 152.3 | 144.4 | 146.4 | 140.0 | 141.9 | 146.2 | 146.4 |
| 30 DAY AVE | 154.5 | 153.3 | 152.8 | 149.1 | 147.9 | 145.9 | 145.0 |
| EVAP. AT 300 F | 82.4 | 80.8 | 80.8 | 78.7 | 79.7 | 82.0 | 81.7 |
| RECOVERY PCT | 96.0 | 97.1 | 96.2 | 96.2 | 95.0 | 96.6 | 96.4 |
| RESIDUE PCT | 1.4 | 1.4 | 1.5 | 1.3 | 1.5 | 1.3 | 1.3 |
| RSH PPM | 2.900 | 1.200 | 1.200 | 1.600 | 1.700 | 2.200 | 1.500 |
| 30 DAY AVE | 1.629 | 1.579 | 1.552 | 1.434 | 1.478 | 1.630 | 1.510 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 3.75 | 4.00 | 3.96 | 3.87 | 3.94 | 3.96 | 3.99 |
| PCT TML | 77.38 | 78.10 | 76.35 | 77.27 | 80.75 | 71.97 | 80.40 |
| KRR BLEND | 99.70 | 99.60 | 99.60 | 99.50 | 99.70 | 100.00 | 99.90 |
| 30 DAY AVE | 99.47 | 99.48 | 99.49 | 99.51 | 99.54 | 99.59 | 99.64 |
| KRM | 91.00 | 89.90 | 90.50 | 90.70 | 91.00 | 90.10 | 90.41 |
| 90AD OCTANE BLND | 99.20 | 98.50 | 98.80 | 98.90 | 99.40 | 99.19 | 98.93 |
| 30 DAY AVE | 99.08 | 99.01 | 98.99 | 98.86 | 98.95 | 98.94 | 98.93 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS. EX.MG/100ML | 0.20 | 0.20 | 1.20 | 0.80 | 0.80 | 0.60 | 0.40 |
| SULFUR | 0.040 | 0.050 | 0.050 | 0.040 | 0.050 | 0.050 | 0.050 |

REGULAR 76 GASOLINE HC & HW SAN FRANCISCO REFINERY PRODUCTS REPORT

| END NUMBER | 33 | 39 | 40 | 47 | 50 | 60 | 61 |
|-----------------|---------|---------|---------|--------|--------|---------|---------|
| TANK NUMBER | 1010 | 1010 | 1006 | 1010 | 1006 | 1010 | 1006 |
| DATE COMPLETED | 3-10-71 | 3-20-71 | 3-21-71 | 4-1-71 | 4-4-71 | 4-19-71 | 4-20-71 |
| BARRELS BLENDED | 24197. | 41111. | 20523. | 39042. | 52546. | 17542. | 19237. |
| GRADE OF BLEND | HW | HW | HW | HW | HC | HW | HC |
| V/L TEMPERATURE | 122. | 122. | 122. | 132. | 122. | 132. | 122. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|
| LUK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LT. WAXY GASO. | 26.8 | 25.9 | 26.0 | 25.0 | 24.5 | 22.2 | 22.0 |
| C5-C6 | 27.6 | 23.5 | 25.2 | 22.5 | 19.0 | 24.2 | 24.0 |
| L.S.T.P. | 45.6 | 44.1 | 43.4 | 50.8 | 51.5 | 53.5 | 54.0 |
| BUTANE | 0.0 | 6.5 | 5.4 | 1.7 | 5.0 | 0.0 | 0.0 |
| LUN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| H.S.T.P. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 99.9 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|------------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 59.1 | 59.0 | 59.4 | 58.5 | 59.0 | 58.3 | 58.2 |
| R.V.P. | 9.8 | 9.5 | 10.1 | 8.7 | 10.5 | 7.5 | 9.7 |
| V/L RATIO | 4.4 | 5.5 | 6.0 | 10.0 | 7.8 | 5.5 | 4.3 |
| 30 DAY AVE | 3.8 | 4.4 | 4.5 | 6.9 | 6.6 | 7.2 | 7.4 |
| 10 PCT POINT | 117.0 | 117.0 | 114.0 | 119.0 | 114.0 | 125.0 | 117.0 |
| MAX DEG.F BLEND | 418.0 | 422.0 | 408.0 | 404.0 | 423.0 | 408.0 | 421.0 |
| 30 DAY AVE | 410.8 | 414.0 | 413.5 | 413.8 | 415.3 | 415.0 | 413.9 |
| W.U.F. BLEND | 165.7 | 167.0 | 169.2 | 165.0 | 164.6 | 154.5 | 160.0 |
| 30 DAY AVE | 166.8 | 166.3 | 166.5 | 165.6 | 166.2 | 164.7 | 163.5 |
| EVAP. AT 300 F | 82.5 | 83.0 | 83.8 | 83.9 | 82.3 | 80.2 | 82.7 |
| RECOVERY PCT | 96.5 | 96.2 | 96.2 | 96.9 | 96.7 | 96.5 | 96.5 |
| RESIDUE PCT | 1.4 | 1.3 | 1.5 | 1.2 | 1.5 | 1.5 | 1.4 |
| RSH PPM | 1.500 | 1.500 | 1.800 | 2.200 | 2.100 | 2.100 | 2.000 |
| 30 DAY AVE | 1.531 | 1.462 | 1.487 | 1.701 | 1.853 | 1.942 | 2.071 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 2.07 | 2.17 | 1.98 | 1.91 | 1.90 | 1.77 | 1.75 |
| KRR BLEND | 94.10 | 94.20 | 94.20 | 94.40 | 94.30 | 94.50 | 94.50 |
| 30 DAY AVE | 94.05 | 94.08 | 94.09 | 94.14 | 94.20 | 94.38 | 94.38 |
| KRM BLEND | 86.50 | 86.20 | 86.40 | 86.60 | 86.00 | 86.20 | 86.10 |
| 7AD OCT. BLEND | 93.00 | 92.90 | 93.00 | 93.10 | 92.80 | 93.00 | 92.90 |
| 30 DAY AVE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS,EX.MG/100ML | 0.40 | 0.40 | 0.20 | 0.60 | 0.20 | 0.40 | 0.40 |
| SULFUR | 0.044 | 0.000 | 0.050 | 0.000 | 0.040 | 0.000 | 0.030 |

REGULAR TO GASOLINE LOADS **SAKAMONICOSO REFINERY** **PRODUCTS REPORT**

| END NUMBER | 37 | 41 | 42 | 45 | 46 | 48 | 54 |
|-----------------|---------|---------|---------|---------|---------|---------|--------|
| TANK NUMBER | 1005 | 1005 | 241 | 1005 | 1005 | 1005 | 1012 |
| DATE COMPLETED | 3-17-71 | 3-22-71 | 3-23-71 | 3-26-71 | 3-28-71 | 3-31-71 | 4-9-71 |
| BARRELS BLENDED | 48775. | 38971. | 19511. | 38934. | 24010. | 32979. | 43593. |
| GRADE OF BLEND | LW | LW | LW | LW | LW | LW | LW |
| V/L TEMPERATURE | 122. | 122. | 122. | 122. | 122. | 132. | 132. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|
| LAR LT. CAT | 17.1 | 23.6 | 0.0 | 0.0 | 0.0 | 0.0 | 14.1 |
| LT. WAXY GASO. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| C5-C6 | 26.5 | 20.5 | 30.4 | 32.6 | 32.2 | 31.1 | 23.4 |
| L.S.T.P. | 46.9 | 46.3 | 50.6 | 49.5 | 49.8 | 51.0 | 51.2 |
| BUTANE | 3.9 | 4.0 | 1.7 | 0.1 | 0.4 | 1.3 | 0.0 |
| LUK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| H.S.T.P. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ALKYLATE | 5.6 | 5.6 | 17.3 | 17.8 | 17.6 | 15.6 | 11.2 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 99.9 |

BLEND QUALITY

| | | | | | | | |
|-------------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 59.7 | 59.4 | 58.8 | 59.2 | 59.0 | 59.1 | 59.2 |
| R.V.P. | 9.8 | 10.4 | 8.3 | 7.7 | 7.5 | 7.9 | 9.0 |
| V/L RATIO | 6.3 | 7.3 | 1.2 | 0.4 | 0.2 | 2.8 | 2.8 |
| 30 DAY AVE | 5.2 | 4.6 | 3.8 | 3.3 | 3.1 | 3.9 | 2.9 |
| 10 PCT POINT | 113.0 | 112.0 | 124.0 | 123.0 | 128.0 | 127.0 | 129.0 |
| MAX DEG.F BLEND | 413.0 | 416.0 | 425.0 | 415.0 | 403.0 | 404.0 | 428.0 |
| 30 DAY AVE | 410.7 | 413.4 | 417.0 | 416.7 | 415.7 | 415.3 | 415.7 |
| W.U.F. BLEND | 161.2 | 168.0 | 150.2 | 156.4 | 151.5 | 147.0 | 152.2 |
| 30 DAY AVE | 161.4 | 161.7 | 159.9 | 159.4 | 158.8 | 157.5 | 157.1 |
| EVAP. AT 300 F | 82.1 | 83.5 | 81.5 | 83.0 | 83.0 | 82.2 | 81.2 |
| RECOVERY PCT | 97.2 | 96.0 | 96.7 | 97.0 | 97.3 | 97.2 | 97.2 |
| RESIDUE PCT | 1.5 | 1.5 | 1.3 | 1.5 | 1.5 | 1.1 | 1.1 |
| RSH PPM | 2.600 | 2.400 | 1.800 | 1.700 | 1.800 | 1.300 | 2.300 |
| 30 DAY AVE | 2.012 | 2.141 | 2.213 | 2.144 | 2.118 | 2.058 | 2.151 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 0.50 | 0.37 | 0.37 | 0.53 | 0.49 | 0.43 | 0.41 |
| KRR BLEND | 95.10 | 95.30 | 94.50 | 94.30 | 94.90 | 94.00 | 95.10 |
| 30 DAY AVE | 95.01 | 95.05 | 95.08 | 94.97 | 94.97 | 94.85 | 94.91 |
| KRM BLEND | 84.80 | 84.60 | 85.30 | 85.30 | 85.70 | 85.30 | 85.00 |
| ROAD OCT. BLEND | 92.80 | 92.80 | 92.90 | 92.80 | 93.20 | 92.70 | 92.90 |
| 30 DAY AVE | 92.81 | 92.77 | 92.80 | 92.80 | 92.83 | 92.81 | 92.84 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS, EX.MG/100ML | 0.00 | 0.20 | 0.20 | 0.20 | 0.00 | 0.00 | 0.40 |
| SULFUR | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

REGULAR 76 GASOLINE LC+LW SAN FRANCISCO REFINERY PRODUCTS REPORT

| | 120 | 122 | 125 | 131 | 133 | 140A | 143 |
|-----------------|---------|---------|--------|---------|---------|---------|---------|
| TANK NUMBER | 1005 | 1012 | 1005 | 1012 | 1005 | 1012 | 1005 |
| DATE COMPLETED | 7-27-71 | 7-30-71 | 8-4-71 | 8-12-71 | 8-18-71 | 8-28-71 | 8-31-71 |
| BARRELS BLENDED | 41134. | 72593. | 78822. | 83803. | 67396. | 93226. | 65372. |
| GRADE OF BLEND | LW | LW | LW | LW | LW | LW | LW |
| V/L TEMPERATURE | 140. | 140. | 140. | 140. | 140. | 140. | 140. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|
| AR LT. CAT | 21.3 | 21.4 | 11.3 | 14.2 | 11.6 | 0.0 | 0.0 |
| LT. WAXY GASO. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| C5-C6 | 22.3 | 22.3 | 23.1 | 40.2 | 0.0 | 24.1 | 25.0 |
| S.S.T.P. | 34.5 | 34.6 | 30.8 | 34.1 | 47.2 | 45.0 | 43.0 |
| HEPTANE | 2.2 | 2.2 | 3.1 | 3.4 | 0.8 | 2.8 | 2.5 |
| ALK | 0.0 | 0.0 | 2.0 | 4.1 | 35.0 | 8.4 | 9.4 |
| S.S.T.P. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EFURMATE | 11.8 | 11.7 | 27.7 | 0.0 | 5.4 | 19.7 | 20.1 |
| LUB. LATE | 7.8 | 7.9 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 99.9 | 100.1 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 57.7 | 57.8 | 55.5 | 56.0 | 56.9 | 54.0 | 54.5 |
| V.P. | 8.7 | 8.7 | 6.0 | 8.5 | 8.3 | 8.7 | 8.7 |
| V/L RATIO | 15.6 | 15.6 | 15.4 | 15.2 | 19.6 | 14.0 | 19.1 |
| 30 DAY AVE | 15.6 | 15.6 | 15.3 | 14.8 | 15.7 | 15.3 | 15.9 |
| O PCT POINT | 124.0 | 124.0 | 123.0 | 123.0 | 122.0 | 123.0 | 129.0 |
| MAX DEG.F BLEND | 426.0 | 419.0 | 417.0 | 415.0 | 424.0 | 423.0 | 428.0 |
| 30 DAY AVE | 417.9 | 418.2 | 423.8 | 418.2 | 419.3 | 419.5 | 421.0 |
| S.U.F. BLEND | 157.3 | 152.3 | 143.8 | 148.6 | 155.4 | 137.9 | 141.5 |
| 30 DAY AVE | 159.6 | 157.9 | 153.0 | 149.4 | 150.6 | 146.9 | 145.0 |
| VAP. AT 300 F | 80.9 | 80.8 | 82.6 | 82.0 | 77.4 | 79.3 | 78.1 |
| ECOVERY PCT | 97.0 | 97.0 | 97.0 | 97.0 | 96.9 | 97.0 | 97.0 |
| RESIDUE PCT | 1.7 | 1.7 | 1.5 | 1.3 | 1.5 | 1.5 | 1.9 |
| SH PPM | 1.500 | 1.800 | 1.800 | 2.400 | 3.500 | 1.000 | 1.200 |
| 30 DAY AVE | 1.351 | 1.454 | 1.579 | 1.937 | 2.243 | 2.028 | 2.031 |
| ORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| HEAD GR/GAL | 0.49 | 0.50 | 0.45 | 0.46 | 0.49 | 0.49 | 0.48 |
| RR BLEND | 95.40 | 95.40 | 95.40 | 95.30 | 94.90 | 95.10 | 94.90 |
| DAY AVE | 95.02 | 95.11 | 95.34 | 95.36 | 95.27 | 95.22 | 95.13 |
| BLEND | 84.90 | 84.80 | 85.00 | 84.80 | 85.40 | 85.60 | 85.40 |
| OCT. BLEND | 92.90 | 92.90 | 93.00 | 92.80 | 93.00 | 93.20 | 93.00 |
| 30 DAY AVE | 92.96 | 92.95 | 92.95 | 92.89 | 92.91 | 92.98 | 93.00 |
| XID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| UMS,EX.MG/100ML | 0.80 | 0.60 | 0.00 | 0.80 | 0.40 | 0.40 | 0.60 |
| SULFUR | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| <u>SUPER 76 GASOLINE</u> | | <u>SAN FRANCISCO, CALIFORNIA</u> | | <u>PRODUCTIVE PERIOD</u> | | | |
|--------------------------------|--------------|----------------------------------|--------------|--------------------------|-------------|--------------|-------------|
| BLEND NUMBER | 91 | 92 | 97 | 101 | 105 | 112 | 115A |
| JK NUMBER | 1004 | 242 | 1004 | 1004 | 1004 | 1004 | 1004 |
| DATE COMPLETED | 6-1-71 | 6-2-71 | 6-8-71 | 6-15-71 | 6-25-71 | 7-5-71 | 7-13-71 |
| BARRELS BLENDED | 39628. | 22893. | 32356. | 33898. | 35544. | 56122. | 29259. |
| GRADE OF BLEND | W | W | W | W | W | W | W |
| V/L TEMPERATURE | 140. | 140. | 140. | 140. | 140. | 140. | 140. |
| <u>COMPOSITION (VOL. PCT.)</u> | | | | | | | |
| ALK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.7 | 3.2 |
| REFORMATE | 20.8 | 15.1 | 18.2 | 16.5 | 18.0 | 0.0 | 24.6 |
| BUTANE | 3.2 | 3.5 | 3.7 | 4.2 | 3.2 | 3.5 | 3.2 |
| S.T.P. | 42.7 | 45.6 | 44.3 | 46.8 | 45.2 | 46.6 | 36.4 |
| C5-C6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| L.T. WAXY GASO. | 23.8 | 26.1 | 25.1 | 21.2 | 22.2 | 21.5 | 16.7 |
| L.T. CAT. | 9.5 | 9.7 | 8.7 | 11.4 | 11.3 | 11.6 | 12.8 |
| LUN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.1 | 99.9 | 100.0 | 99.9 |
| <u>BLEND QUALITY</u> | | | | | | | |
| GRAVITY API | 53.4 | 53.4 | 53.3 | 54.2 | 54.3 | 58.0 | 55.1 |
| R.V.P. | 8.8 | 8.7 | 6.5 | 8.9 | 7.0 | 8.8 | 8.6 |
| V/L RATIO | 12.5 | 11.9 | 12.7 | 15.0 | 14.6 | 15.4 | 12.0 |
| 30 DAY AVE | 7.3 | 7.6 | 8.4 | 10.1 | 13.3 | 14.5 | 14.5 |
| 10 PCT POINT | 127.0 | 125.0 | 129.0 | 119.0 | 123.0 | 128.0 | 127.0 |
| MAX DEG.F BLEND | 411.0 | 416.0 | 424.0 | 414.0 | 406.0 | 406.0 | 426.0 |
| 30 DAY AVE | 424.5 | 423.9 | 423.2 | 421.1 | 414.6 | 411.4 | 411.1 |
| V.U.F. BLEND | 133.9 | 134.9 | 133.5 | 141.0 | 134.4 | 130.4 | 135.4 |
| 30 DAY AVE | 131.3 | 131.6 | 130.6 | 131.8 | 134.0 | 134.2 | 134.5 |
| EVAP. AT 300 F | 82.0 | 81.5 | 81.7 | 82.5 | 83.6 | 83.5 | 81.9 |
| RECOVERY PCT | 96.9 | 96.5 | 96.9 | 95.0 | 96.0 | 97.0 | 96.0 |
| RESIDUE PCT | 1.4 | 1.5 | 1.4 | 1.5 | 1.4 | 1.5 | 1.6 |
| RSH PPM | 1.900 | 0.800 | 0.900 | 3.400 | 1.600 | 1.000 | 1.200 |
| 30 DAY AVE | 1.172 | 1.146 | 1.099 | 1.315 | 1.620 | 1.629 | 1.714 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 3.89 | 3.87 | 3.76 | 3.85 | 3.85 | 3.74 | 3.89 |
| PCT TML | 79.80 | 80.79 | 79.89 | 79.71 | 80.07 | 79.89 | 80.57 |
| KRR BLEND | 99.50 | 99.50 | 99.60 | 99.60 | 99.50 | 99.50 | 99.60 |
| 30 DAY AVE | 99.55 | 99.54 | 99.54 | 99.55 | 99.59 | 99.54 | 99.53 |
| KRM | 91.50 | 91.50 | 91.20 | 91.30 | 91.20 | 91.40 | 91.90 |
| P-70 OCTANE BLND | 100.20 | 100.10 | 100.60 | 100.00 | 99.80 | 100.10 | 99.97 |
| 30 DAY AVE | 99.97 | 99.98 | 100.05 | 100.09 | 100.11 | 100.11 | 99.98 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS. EX.MG/100ML | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.20 | 1.00 |
| SULFUR | 0.020 | 0.020 | 0.010 | 0.020 | 0.030 | 0.020 | 0.028 |

MAY 1 1972

SUPER 76 GASOLINE SAN FRANCISCO REFINERY PRODUCTS REPORT

| END NUMBER | 57 | 59 | 61 | 66 | 68 | 74 | 76 |
|-----------------|---------|---------|---------|--------|--------|---------|---------|
| TANK NUMBER | 1004 | 1004 | 1004 | 1004 | 1004 | 1004 | 1004 |
| DATE COMPLETED | 3-25-72 | 3-27-72 | 3-31-72 | 4-4-72 | 4-7-72 | 4-16-72 | 4-20-72 |
| BARRELS BLENDED | 69587. | 48764. | 59455. | 19857. | 48694. | 49821. | 65482. |
| GRADE OF BLEND | W | W | W | W | W | W | W |
| V/L TEMPERATURE | 132. | 132. | 132. | 132. | 132. | 132. | 132. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|-----------------|--------------|--------------|-------------|-------------|--------------|--------------|--------------|
| LUK | 37.9 | 38.1 | 38.4 | 3.6 | 32.8 | 27.1 | 27.0 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 23.9 | 24.2 | 23.4 | 39.2 | 12.4 | 23.5 | 25.5 |
| BUTANE | 1.3 | 0.5 | 0.9 | 3.4 | 0.3 | 1.7 | 1.6 |
| L.S.T.O. | 36.9 | 37.1 | 37.2 | 21.6 | 49.9 | 23.5 | 24.3 |
| C5-C6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.2 | 21.5 |
| L.T. WAXY GASO. | 0.0 | 0.0 | 0.0 | 32.1 | 4.7 | 0.0 | 0.0 |
| L.T. CAT. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LIJN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 100.0 | 100.0 | 99.9 | 99.9 | 100.1 | 100.0 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|------------------|--------|--------|--------|--------|--------|--------|--------|
| GRAVITY API | 56.0 | 55.5 | 56.2 | 54.1 | 55.2 | 57.9 | 58.6 |
| R.V.P. | 8.7 | 8.2 | 8.0 | 8.5 | 8.2 | 6.4 | 9.0 |
| V/L RATIO | 7.8 | 2.2 | 6.0 | 3.6 | 8.2 | 12.8 | 12.8 |
| 30 DAY AVE | 4.6 | 4.4 | 4.9 | 4.6 | 5.5 | 5.3 | 8.1 |
| 10 PCT POINT | 122.0 | 122.0 | 121.0 | 136.0 | 131.0 | 121.0 | 121.0 |
| MAX DEG.F BLEND | 413.0 | 415.0 | 419.0 | 406.0 | 421.0 | 407.0 | 407.0 |
| 30 DAY AVE | 409.6 | 410.1 | 412.4 | 411.1 | 413.4 | 412.3 | 413.0 |
| W.U.F. BLEND | 145.7 | 146.7 | 147.3 | 131.6 | 138.5 | 169.7 | 170.0 |
| 30 DAY AVE | 145.1 | 145.2 | 146.4 | 145.5 | 143.8 | 146.5 | 152.0 |
| EVAP. AT 300 F | 79.6 | 81.2 | 79.9 | 81.5 | 78.1 | 83.3 | 85.6 |
| RECOVERY PCT | 96.5 | 96.5 | 97.0 | 96.9 | 97.0 | 97.0 | 97.5 |
| RESIDUE PCT | 1.4 | 1.3 | 1.2 | 1.4 | 1.4 | 1.2 | 0.9 |
| RSH PPM | 1.000 | 0.900 | 0.000 | 0.500 | 0.600 | 2.000 | 3.200 |
| 30 DAY AVE | 0.702 | 0.721 | 0.652 | 0.662 | 0.650 | 0.814 | 1.276 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 2.48 | 2.40 | 2.50 | 3.48 | 3.49 | 3.81 | 3.94 |
| PCT TML | 80.69 | 78.77 | 79.89 | 79.59 | 88.88 | 80.66 | 81.38 |
| KRR BLEND | 99.50 | 99.50 | 99.51 | 99.51 | 99.51 | 99.50 | 99.52 |
| 30 DAY AVE | 99.51 | 99.51 | 99.51 | 99.50 | 99.50 | 99.50 | 99.50 |
| RM | 93.12 | 92.54 | 92.65 | 92.12 | 92.46 | 92.93 | 92.15 |
| JAD OCTANE BLND | 101.42 | 101.17 | 101.22 | 101.08 | 101.23 | 100.84 | 99.80 |
| 30 DAY AVE | 101.14 | 101.14 | 101.21 | 101.19 | 101.23 | 101.19 | 100.99 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS+EX.MG/100ML | 0.20 | 0.40 | 0.60 | 0.20 | 0.60 | 0.20 | 0.00 |
| SULFUR | 0.001 | 0.001 | 0.003 | 0.003 | 0.006 | 0.038 | 0.043 |

REGULAR 76 GASOLINE LC+LW SAN FRANCISCO REFINERY PRODUCTS REPORT

| BLEND NUMBER | 75 | 78 | 82A | 84 | 90 | 94 | 95 | 99 |
|-----------------|---------|---------|---------|---------|--------|---------|---------|------|
| TANK NUMBER | 1001 | 1001 | 1001 | 1005 | 1005 | 1001 | 1001 | 1005 |
| DATE COMPLETED | 4-17-72 | 4-23-72 | 4-30-72 | 4-30-72 | 5-5-72 | 5-10-72 | 5-17-72 | |
| BARRELS BLENDED | 38777. | 41791. | 62616. | 19209. | 37808. | 64267. | 63870. | |
| GRADE OF BLEND | LW | LW | LW | LW | LW | LW | LW | LW |
| V/L TEMPERATURE | 132. | 132. | 132. | 132. | 132. | 132. | 132. | 132. |

COMPOSITION (VOL. PCT.)

| | | | | | | | | |
|----------------|--------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|
| LAR LT. CAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LT. WAXY GASO. | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 14.0 |
| C5-C6 | 10.2 | 11.2 | 18.4 | 20.2 | 23.1 | 21.4 | 20.1 | 0.0 |
| L.S.T.O. | 30.0 | 30.8 | 21.0 | 24.6 | 21.1 | 20.1 | 12.8 | |
| BUTANE | 0.0 | 0.0 | 3.9 | 0.0 | 2.9 | 3.1 | 3.0 | |
| LUK | 21.9 | 21.2 | 13.7 | 13.6 | 15.0 | 15.1 | 14.8 | |
| H.S.T.O. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 37.9 | 36.7 | 41.8 | 41.6 | 38.0 | 40.3 | 44.3 | |
| L.U.N. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.6 |
| TOTAL | 100.0 | 99.9 | 100.1 | 100.0 | 100.1 | 100.0 | 100.0 | 100.0 |
| | 67.9 | 68.5 | 61.8 | 66.2 | 59.1 | 60.1 | | 57.1 |

BLEND QUALITY

| | | | | | | | | |
|-------------------|-------|-------|-------|-------|-------|-------|-------|--|
| GRAVITY API | 52.5 | 53.0 | 53.6 | 53.5 | 54.5 | 54.6 | 54.4 | |
| R.V.P. | 6.5 | 7.2 | 8.8 | 9.1 | 8.5 | 8.6 | 8.7 | |
| V/L RATIO | 1.0 | 0.8 | 5.0 | 1.0 | 5.8 | 5.8 | 3.6 | |
| 30 DAY AVE | 2.1 | 1.7 | 2.7 | 2.6 | 3.2 | 3.9 | 3.8 | |
| 10 PCT POINT | 131.0 | 133.0 | 130.0 | 126.0 | 124.0 | 124.0 | 134.0 | |
| MAX DEG.F BLEND | 407.0 | 406.0 | 410.0 | 404.0 | 400.0 | 396.0 | 392.0 | |
| 30 DAY AVE | 389.2 | 391.4 | 406.5 | 406.2 | 404.9 | 403.4 | 401.3 | |
| W.U.F. BLEND | 130.4 | 131.3 | 129.2 | 131.1 | 140.3 | 140.5 | 133.5 | |
| 30 DAY AVE | 131.4 | 131.7 | 128.3 | 128.6 | 131.1 | 134.6 | 134.4 | |
| EVAP. AT 300 F | 82.2 | 82.0 | 79.3 | 80.3 | 80.8 | 82.1 | 83.0 | |
| RECOVERY PCT | 97.0 | 97.0 | 97.0 | 96.5 | 96.3 | 96.5 | 97.0 | |
| RESIDUE PCT | 1.4 | 1.5 | 1.2 | 1.2 | 1.4 | 1.4 | 1.3 | |
| RSH PPM | 2.000 | 1.800 | 1.800 | 2.000 | 1.000 | 1.400 | 1.400 | |
| 30 DAY AVE | 1.774 | 2.033 | 2.117 | 2.106 | 1.867 | 1.587 | 1.553 | |
| CORK.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| LEAD GR/GAL | 0.50 | 0.43 | 0.47 | 0.48 | 0.44 | 0.48 | 0.47 | |
| KRR BLEND | 96.77 | 96.62 | 96.79 | 96.45 | 96.54 | 96.88 | 96.21 | |
| 30 DAY AVE | 96.72 | 96.80 | 96.73 | 96.71 | 96.67 | 96.70 | 96.61 | |
| KRM BLEND | 86.08 | 86.11 | 86.13 | 86.15 | 86.06 | 86.09 | 86.01 | |
| 1D OCT. BLEND | 92.72 | 92.74 | 92.76 | 92.77 | 92.71 | 92.73 | 92.67 | |
| 30 DAY AVE | 92.71 | 92.71 | 92.73 | 92.73 | 92.73 | 92.73 | 92.72 | |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | |
| GUMS, EX.MG/100ML | 0.60 | 0.40 | 0.40 | 0.20 | 0.00 | 0.00 | 0.00 | |
| SULFUR | 0.030 | 0.038 | 0.033 | 0.035 | 0.027 | 0.027 | 0.028 | |

REGULAR 76 GASOLINE HC + HW SAN FRANCISCO REFINERY PRODUCTS REPORT

| | | | | | | | |
|-----------------|---------|--------|--------|--------|---------|---------|---------|
| BLEND NUMBER | 111 | 113 | 117 | 118 | 124 | 128 | 131 |
| ANK NUMBER | 241 | 1010 | 241 | 1010 | 1006 | 1010 | 1006 |
| DATE COMPLETED | 5-31-72 | 6-4-72 | 6-6-72 | 6-7-72 | 6-16-72 | 6-20-72 | 6-22-72 |
| BARRELS BLENDED | 28840. | 25165. | 19298. | 45607. | 48194. | 35774. | 29035. |
| GRADE OF BLEND | HC | HW | HC | HW | HW | HW | HW |
| V/L TEMPERATURE | 127. | 140. | 127. | 140. | 140. | 140. | 140. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| LUK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 | 0.0 |
| LT. WAXY GASO. | 0.0 | 28.4 | 22.8 | 29.8 | 27.3 | 28.0 | 48.4 |
| C5-C6 | 23.3 | 15.6 | 26.4 | 20.5 | 25.0 | 25.0 | 0.0 |
| L.S.T.O. | 50.3 | 54.7 | 37.5 | 49.6 | 44.8 | 43.8 | 49.3 |
| BUTANE | 5.8 | 0.0 | 5.6 | 0.0 | 1.7 | 1.3 | 2.7 |
| LUN | 20.6 | 1.4 | 0.0 | 0.0 | 1.2 | 0.0 | 1.7 |
| H.S.T.O. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 0.0 | 0.0 | 7.7 | 4.1 | 0.0 | 0.0 | 0.0 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 100.0 | 100.1 | 100.0 | 100.0 | 100.0 | 100.1 | 100.1 |

BLEND QUALITY

| | | | | | | | |
|-------------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 61.0 | 55.7 | 60.5 | 56.7 | 58.9 | 58.7 | 57.4 |
| R.V.P. | 10.8 | 7.5 | 10.4 | 7.6 | 8.4 | 8.7 | 8.5 |
| V/L RATIO | 16.4 | 5.2 | 16.2 | 6.0 | 19.0 | 17.5 | 15.2 |
| 30 DAY AVE | 8.5 | 8.0 | 8.2 | 8.2 | 8.4 | 8.8 | 8.9 |
| 10 PCT POINT | 113.0 | 136.0 | 115.0 | 132.0 | 126.0 | 126.0 | 129.0 |
| MAX DEG.F BLEND | 417.0 | 424.0 | 420.0 | 425.0 | 414.0 | 416.0 | 412.0 |
| 30 DAY AVE | 418.6 | 420.0 | 420.0 | 420.3 | 420.1 | 419.8 | 419.6 |
| W.U.F. BLEND | 156.9 | 128.6 | 153.7 | 141.3 | 153.2 | 155.5 | 149.1 |
| 30 DAY AVE | 155.5 | 153.8 | 153.7 | 153.4 | 153.2 | 153.9 | 153.6 |
| EVAP. AT 300 F | 82.7 | 75.9 | 79.9 | 82.4 | 80.6 | 80.4 | 79.1 |
| RECOVERY PCT | 96.0 | 97.3 | 96.5 | 97.2 | 97.0 | 97.0 | 96.1 |
| RESIDUE PCT | 1.2 | 1.5 | 1.9 | 1.6 | 1.2 | 1.2 | 1.9 |
| RSH PPM | 1.000 | 1.500 | 1.000 | 1.300 | 1.300 | 2.800 | 2.000 |
| 30 DAY AVE | 1.630 | 1.632 | 1.619 | 1.612 | 1.615 | 1.660 | 1.682 |
| CORK.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 2.15 | 2.72 | 2.19 | 2.83 | 2.84 | 2.73 | 2.97 |
| KRR BLEND | 93.81 | 93.82 | 93.80 | 93.81 | 93.80 | 93.82 | 93.89 |
| 30 DAY AVE | 93.81 | 93.81 | 93.81 | 93.81 | 93.81 | 93.81 | 93.81 |
| KRM BLEND | 87.30 | 86.85 | 87.03 | 87.30 | 87.25 | 86.81 | 86.28 |
| AD OCT. BLEND | 93.95 | 93.61 | 93.75 | 93.95 | 93.91 | 93.57 | 94.69 |
| 30 DAY AVE | 94.44 | 94.35 | 94.34 | 94.33 | 94.32 | 94.31 | 94.33 |
| XID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS EX. MG/100ML | 0.60 | 0.00 | 0.40 | 0.40 | 0.40 | 0.40 | 0.60 |
| SULFUR | 0.023 | 0.027 | 0.024 | 0.033 | 0.042 | 0.030 | 0.015 |

REGULAR 76 GASOLINE HC + HW SAN FRANCISCO REFINERY PRODUCTS REPORT

| | | | | | | | |
|-----------------|---------|---------|---------|---------|---------|--------|---------|
| END NUMBER | 148 | 151 | 156 | 0161 | 0163 | 169 | 176 |
| TANK NUMBER | 241 | 1010 | 241 | 1006 | 1010 | 1006 | 1010 |
| DATE COMPLETED | 7-15-72 | 7-17-72 | 7-23-72 | 7-26-72 | 7-30-72 | 8-4-72 | 8-10-72 |
| BARRELS BLENDED | 14660. | 23529. | 53656. | 38558. | 49806. | 28733. | 50025. |
| GRADE OF BLEND | HC | HW | HC | HW | HW | HW | HW |
| V/L TEMPERATURE | 127. | 140. | 127. | 140. | 140. | 140. | 140. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|-----------------|--------------|--------------|-------------|--------------|--------------|-------------|-------------|
| ALK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.6 | 0.0 |
| L.T. WAXY GASO. | 9.4 | 15.5 | 22.7 | 19.9 | 24.4 | 39.8 | 33.9 |
| C5-C6 | 20.9 | 22.9 | 19.9 | 23.6 | 16.8 | 0.0 | 17.3 |
| L.S.T.P. | 50.2 | 50.3 | 43.0 | 46.9 | 50.2 | 48.1 | 46.9 |
| BUTANE | 7.0 | 2.3 | 5.4 | 2.2 | 2.6 | 1.0 | 1.8 |
| LUN | 12.5 | 9.0 | 8.9 | 7.5 | 6.0 | 0.4 | 0.0 |
| H.S.T.P. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 100.0 | 100.0 | 99.9 | 100.1 | 100.0 | 99.9 | 99.9 |

BLEND QUALITY

| | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 59.2 | 57.0 | 58.9 | 57.8 | 57.3 | 57.8 | 57.8 |
| R.V.P. | 10.6 | 8.6 | 10.7 | 8.8 | 7.2 | 8.4 | 8.5 |
| V/L RATIO | 16.4 | 14.0 | 16.0 | 15.6 | 14.4 | 14.2 | 15.4 |
| 30 DAY AVE | 15.8 | 15.1 | 15.0 | 15.1 | 14.8 | 14.8 | 15.0 |
| 10 PCT POINT | 114.0 | 126.0 | 114.0 | 125.0 | 129.0 | 132.0 | 127.0 |
| MAX DEG.F BLEND | 420.0 | 426.0 | 419.0 | 421.0 | 423.0 | 419.0 | 428.0 |
| 30 DAY AVE | 417.3 | 418.4 | 419.4 | 419.6 | 421.4 | 421.1 | 421.8 |
| V.U.F. BLEND | 142.8 | 137.0 | 151.8 | 141.8 | 139.3 | 142.0 | 146.5 |
| 30 DAY AVE | 144.7 | 142.8 | 142.9 | 142.7 | 142.1 | 142.3 | 143.8 |
| EVAP. AT 300 F | 78.0 | 77.2 | 80.5 | 78.1 | 78.2 | 79.5 | 79.1 |
| RECOVERY PCT | 96.0 | 96.8 | 96.7 | 96.0 | 96.6 | 97.1 | 96.5 |
| RESIDUE PCT | 1.5 | 1.2 | 1.3 | 1.3 | 1.3 | 1.4 | 1.5 |
| ARSH PPM | 2.600 | 1.800 | 1.000 | 2.600 | 2.200 | 0.600 | 1.900 |
| 30 DAY AVE | 1.518 | 1.572 | 1.285 | 1.433 | 1.590 | 1.569 | 1.725 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 2.22 | 2.84 | 2.81 | 3.03 | 2.93 | 2.80 | 3.07 |
| KRR BLEND | 93.80 | 93.80 | 93.81 | 93.82 | 93.81 | 93.79 | 93.81 |
| 30 DAY AVE | 93.82 | 93.83 | 93.82 | 93.82 | 93.82 | 93.80 | 93.80 |
| KRM BLEND | 87.05 | 87.36 | 87.20 | 87.08 | 87.47 | 87.25 | 87.52 |
| 10 OCT. BLEND | 93.76 | 93.99 | 93.87 | 93.78 | 94.08 | 93.91 | 94.16 |
| 30 DAY AVE | 93.81 | 93.81 | 93.76 | 93.76 | 93.83 | 93.88 | 93.88 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS, EX. MG/100ML | 0.40 | 0.00 | 0.40 | 0.40 | 0.20 | 0.20 | 0.20 |
| SULFUR | 0.025 | 0.036 | 0.029 | 0.030 | 0.030 | 0.012 | 0.012 |

REGULAR 76 GASOLINE LC+LW SAN FRANCISCO REFINERY PRODUCTS REPORT

| | | | | | | | |
|-----------------|--------|---------|---------|---------|---------|---------|--------|
| END NUMBER | 174 | 177 | 180 | 182 | 188 | 191 | 194 |
| ANK NUMBER | 288 | 1001 | 287 | 288 | 1001 | 1002 | 287 |
| DATE COMPLETED | 8-8-72 | 8-12-72 | 8-15-72 | 8-19-72 | 8-24-72 | 8-30-72 | 9-2-72 |
| BARRELS BLENDED | 49726. | 50435. | 54040. | 52228. | 66461. | 50099. | 49884. |
| GRADE OF BLEND | LW | LW | LW | LW | LW | LW | LW |
| V/L TEMPERATURE | 140. | 140. | 140. | 140. | 140. | 140. | 140. |

COMPOSITION (VOL. PCT.),

| | | | | | | | |
|----------------|--------------|--------------|--------------|--------------|-------------|-------------|--------------|
| LAR LT. CAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LT. WAXY GASO. | 9.1 | 0.0 | 0.0 | 2.7 | 9.6 | 3.5 | 13.0 |
| C9-C6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| L.S.T.P. | 17.5 | 24.7 | 24.2 | 28.7 | 28.8 | 38.7 | 39.3 |
| BUTANE | 2.2 | 3.1 | 2.4 | 2.5 | 1.3 | 2.5 | 2.2 |
| LUK | 24.3 | 25.4 | 26.4 | 25.9 | 26.2 | 25.9 | 22.9 |
| H.S.T.P. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 38.8 | 33.7 | 34.8 | 32.0 | 31.8 | 22.9 | 22.6 |
| L.U.N. | 8.1 | 13.1 | 12.2 | 8.1 | 2.2 | 6.4 | 0.0 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 99.9 | 99.9 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 55.1 | 55.1 | 55.1 | 55.0 | 54.8 | 54.9 | 54.8 |
| R.V.P. | 8.6 | 8.8 | 8.7 | 8.9 | 8.6 | 6.8 | 8.7 |
| V/L RATIO | 15.8 | 17.0 | 15.6 | 17.2 | 14.3 | 15.5 | 14.7 |
| 30 DAY AVE | 15.8 | 16.0 | 15.9 | 16.3 | 15.9 | 16.0 | 16.0 |
| 10 PCT POINT | 129.0 | 121.0 | 129.0 | 129.0 | 126.0 | 130.0 | 125.0 |
| MAX DEG.F BLEND | 390.0 | 399.0 | 395.0 | 422.0 | 405.0 | 412.0 | 417.0 |
| 30 DAY AVE | 395.0 | 393.3 | 393.5 | 393.7 | 395.6 | 400.2 | 403.0 |
| W.U.F. BLEND | 139.0 | 138.9 | 138.7 | 127.0 | 142.0 | 131.5 | 134.9 |
| 30 DAY AVE | 133.8 | 135.1 | 135.4 | 136.2 | 137.3 | 138.4 | 137.6 |
| EVAP. AT 300 F | 83.0 | 81.4 | 81.8 | 76.3 | 81.4 | 77.8 | 79.1 |
| RECOVERY PCT | 96.7 | 95.0 | 96.0 | 97.0 | 97.3 | 96.0 | 0.0 |
| RESIDUE PCT | 1.3 | 1.1 | 1.3 | 1.2 | 1.3 | 1.5 | 1.3 |
| RSH PPM | 0.800 | 0.400 | 0.900 | 1.400 | 1.800 | 1.400 | 1.000 |
| 30 DAY AVE | 0.922 | 0.909 | 0.908 | 0.947 | 1.112 | 1.177 | 1.175 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 0.45 | 0.49 | 0.37 | 0.46 | 0.50 | 0.45 | 0.50 |
| 30 DAY AVE | 0.45 | 0.46 | 0.45 | 0.45 | 0.46 | 0.45 | 0.46 |
| KRR BLEND | 94.70 | 95.31 | 95.33 | 94.73 | 94.12 | 94.41 | 94.64 |
| 30 DAY AVE | 96.11 | 96.17 | 96.09 | 95.81 | 95.48 | 95.14 | 94.91 |
| M BLEND | 86.10 | 86.07 | 86.06 | 86.06 | 86.05 | 86.11 | 86.09 |
| 1AD OCT. BLEND | 92.74 | 92.71 | 92.70 | 92.70 | 92.70 | 92.75 | 92.73 |
| 30 DAY AVE | 92.71 | 92.72 | 92.72 | 92.72 | 92.71 | 92.71 | 92.71 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS, EX. MG/100ML | 0.00 | 0.40 | 0.40 | 0.00 | 0.40 | 0.680 | 0.620 |
| SULFUR | 0.013 | 0.007 | 0.004 | 0.005 | 0.003 | 0.005 | 0.010 |

SUB - REGULAR C + H SAN FRANCISCO RECOVERY PRODUCTS REPORT

| | | | | | | | |
|-----------------|---------|---------|---------|---------|---------|---------|---------|
| BLEND NUMBER | 175 | 181 | 185A | 192 | 199 | 200 | 204 |
| TANK NUMBER | 60 | 1002 | 1003 | 1003 | 1003 | 1003 | 60 |
| DATE COMPLETED | 8-13-72 | 8-18-72 | 8-27-72 | 8-30-72 | 9-12-72 | 9-16-72 | 9-24-72 |
| BARRELS BLENDED | 30908. | 54037. | 64782. | 29503. | 58137. | 31635. | 40879. |
| GRADE OF BLEND | W | W | W | W | W | W | W |
| V/L TEMPERATURE | 140. | 140. | 140. | 140. | 140. | 132. | 122. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|--------------|--------------|--------------|-------------|--------------|-------------|--------------|
| L, S, T, P. | 34.2 | 50.6 | 47.7 | 48.7 | 48.9 | 48.5 | 55.6 |
| LT, WAXY GASO. | 42.9 | 35.0 | 20.0 | 27.1 | 0.0 | 0.0 | 5.2 |
| C5-C6 | 0.0 | 6.6 | 13.0 | 21.9 | 14.3 | 15.3 | 14.3 |
| LUN | 21.1 | 7.9 | 19.4 | 0.0 | 32.5 | 32.7 | 20.7 |
| BUTANE | 1.8 | 0.0 | 0.0 | 2.2 | 3.8 | 3.9 | 2.3 |
| LUK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 100.0 | 100.1 | 100.1 | 99.9 | 100.0 | 99.9 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|-------------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 59.7 | 56.9 | 37.7 | 58.2 | 57.6 | 57.5 | 57.0 |
| REYSP. | 8.4 | 8.1 | 7.1 | 7.9 | 8.8 | 8.5 | 8.4 |
| V/L RATIO | 14.6 | 8.4 | 7.4 | 12.4 | 11.9 | 7.5 | 4.9 |
| 30 DAY AVE | 12.5 | 11.5 | 9.7 | 10.0 | 10.2 | 9.3 | 8.7 |
| 10 PCT POINT | 132.0 | 130.0 | 129.0 | 129.0 | 134.0 | 129.0 | 132.0 |
| MAX DEG.F BLEND | 416.0 | 423.0 | 422.0 | 425.0 | 428.0 | 429.0 | 422.0 |
| 30 DAY AVE | 412.9 | 415.3 | 416.2 | 417.2 | 423.2 | 424.9 | 424.9 |
| W.U.F. BLEND | 153.5 | 136.8 | 149.9 | 145.4 | 135.8 | 139.7 | 131.3 |
| 30 DAY AVE | 143.4 | 141.9 | 144.7 | 144.8 | 143.3 | 141.5 | 140.8 |
| EVAP. AT 300 F | 84.5 | 79.2 | 81.1 | 79.5 | 79.0 | 80.0 | 78.5 |
| RECOVERY PCT | 96.6 | 97.0 | 97.0 | 97.1 | 96.5 | 97.0 | 95.8 |
| RESIDUE PCT | 1.2 | 1.2 | 1.3 | 1.2 | 1.5 | 1.2 | 1.2 |
| RSH PPM | 1.200 | 0.800 | 1.100 | 1.300 | 1.000 | 1.200 | 0.400 |
| 30 DAY AVE | 1.558 | 1.381 | 1.148 | 1.166 | 1.045 | 1.045 | 0.987 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 2.97 | 1.60 | 1.76 | 1.56 | 1.70 | 1.67 | 1.52 |
| KRR BLEND | 91.51 | 91.51 | 91.52 | 91.52 | 91.52 | 91.52 | 91.50 |
| 30 DAY AVE | 91.51 | 91.51 | 91.51 | 91.51 | 91.51 | 91.51 | 91.51 |
| KRM BLEND | 87.05 | 85.82 | 84.98 | 84.57 | 85.41 | 85.19 | 85.70 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| UMS, EX. MG/100ML | 0.40 | 0.40 | 0.40 | 0.20 | 0.20 | 0.20 | 0.20 |
| SULFUR | 0.011 | 0.013 | 0.029 | 0.033 | 0.020 | 0.022 | 0.021 |

SUPER TUL GASOLINE 50/50 TURBULOGUE REFINERY PRODUCT REPORT

| BLEND NUMBER | 190 | 202 | 205 | 214 | 215 | 216 | 229 |
|-----------------|--------|---------|---------|---------|----------|----------|----------|
| RANK NUMBER | 51 | 1004 | 1002 | 61 | 1004 | 242 | 61 |
| DATE COMPLETED | 9-1-72 | 9-22-72 | 9-29-72 | 10-9-72 | 10-11-72 | 10-12-72 | 10-23-72 |
| BARRELS BLENDED | 35058. | 69169. | 74471. | 19768. | 34654. | 34653. | 24925. |
| GRADE OF BLEND | W | W | W | C | W | W | C |
| V/L TEMPERATURE | 140. | 132. | 132. | 107. | 132. | 132. | 107. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|--------------|-------------|--------------|--------------|-------------|--------------|--------------|
| LUK | 17.0 | 0.0 | 0.0 | 4.3 | 25.7 | 17.9 | 13.1 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 0.0 | 14.7 | 14.6 | 16.2 | 43.2 | 30.2 | 24.1 |
| BUTANE | 2.0 | 2.1 | 1.7 | 13.2 | 3.0 | 2.5 | 11.3 |
| L.S.T.P. | 62.2 | 49.5 | 50.4 | 45.6 | 0.4 | 30.0 | 34.3 |
| C3-C6 | 18.8 | 25.0 | 26.9 | 20.7 | 27.5 | 19.4 | 15.2 |
| LT. WAXY GASO. | 0.0 | 8.6 | 6.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| LT. CAT. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LUN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 100.0 | 99.9 | 100.0 | 100.0 | 99.9 | 100.0 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|-------------------|--------|--------|--------|--------|--------|--------|--------|
| GRAVITY (API) | 54.6 | 53.7 | 53.2 | 57.0 | 55.2 | 54.9 | 57.4 |
| R.V.P. | 8.7 | 9.0 | 8.4 | 11.3 | 8.6 | 7.2 | 12.5 |
| V/L RATIO | 15.0 | 5.6 | 5.4 | 2.2 | 5.5 | 6.4 | 0.0 |
| 30 DAY AVE | 15.1 | 12.7 | 8.9 | 5.0 | 5.1 | 5.3 | 5.3 |
| 10 PCT POINT | 123.0 | 123.0 | 121.0 | 106.0 | 127.0 | 127.0 | 103.0 |
| MAX DEG.F BLEND | 421.0 | 416.0 | 409.0 | 418.0 | 392.0 | 414.0 | 407.0 |
| 30 DAY AVE | 420.6 | 419.2 | 416.7 | 413.0 | 409.3 | 410.0 | 407.0 |
| W.U.F. BLEND | 131.8 | 131.9 | 133.1 | 143.3 | 139.9 | 142.8 | 144.0 |
| 30 DAY AVE | 131.7 | 132.2 | 131.6 | 133.8 | 134.8 | 136.0 | 138.0 |
| EVAP. AT 300 F | 76.2 | 76.9 | 77.3 | 78.8 | 81.1 | 80.5 | 79.0 |
| RECOVERY PCT | 97.2 | 95.8 | 96.0 | 95.0 | 97.3 | 96.2 | 95.0 |
| RESIDUE PCT | 1.2 | 1.2 | 1.7 | 1.2 | 1.3 | 1.3 | 1.2 |
| RSH (PPM) | 1.900 | 1.200 | 1.000 | 0.800 | 1.000 | 2.500 | 1.300 |
| 30 DAY AVE | 1.354 | 1.458 | 1.152 | 1.060 | 1.049 | 1.255 | 1.293 |
| corr. 3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD (GR/GAL) | 3.59 | 3.79 | 3.96 | 3.10 | 3.52 | 2.97 | 2.93 |
| PCT TML | 81.31 | 80.65 | 80.39 | 78.62 | 79.75 | 76.58 | 79.95 |
| KRR BLEND | 99.50 | 99.51 | 99.50 | 99.51 | 99.52 | 99.40 | 99.53 |
| 30 DAY AVE | 99.51 | 99.51 | 99.50 | 99.50 | 99.50 | 99.49 | 99.49 |
| KRM | 91.90 | 91.24 | 91.12 | 92.13 | 91.49 | 91.59 | 91.79 |
| 9AD OCTANE BLND | 100.17 | 99.93 | 99.74 | 100.24 | 100.50 | 100.50 | 100.85 |
| 30 DAY AVE | 100.47 | 100.19 | 99.98 | 99.88 | 99.98 | 100.08 | 100.23 |
| OXID. STAB. MIN. | 270.00 | 270.00 | 270.00 | 270.00 | 270.00 | 270.00 | 270.00 |
| GUMS, EX.MG/100ML | 0.20 | 0.60 | 0.40 | 0.40 | 0.60 | 0.60 | 0.20 |
| SULFUR | 0.023 | 0.022 | 0.027 | 0.021 | 0.026 | 0.026 | 0.020 |

SUPER 76 GASOLINE SAN FRANCISCO REFINERY PRODUCTS REPORT

| <u>BLEND NUMBER</u> | 202 | 205 | 214 | 215 | 216 | 222 | 223 |
|---------------------|---------|---------|---------|----------|----------|----------|----------|
| TANK NUMBER | 1004 | 1002 | 61 | 1004 | 242 | 1004 | 1004 |
| DATE COMPLETED | 9-22-72 | 9-29-72 | 10-9-72 | 10-11-72 | 10-12-72 | 10-18-72 | 10-23-72 |
| BARRELS BLENDED | 69169. | 74471. | 19769. | 34654. | 34656. | 64283. | 64502. |
| GRADE OF BLEND | W | W | C | W | W | W | W |
| V/L TEMPERATURE | 132. | 132. | 107. | 132. | 132. | 132. | 132. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|-------------|--------------|--------------|-------------|--------------|--------------|--------------|
| LUK | 0.0 | 0.0 | 4.3 | 25.7 | 17.9 | 25.4 | 25.5 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 14.7 | 14.6 | 16.2 | 43.2 | 30.2 | 10.7 | 23.3 |
| BUTANE | 2.1 | 1.7 | 13.2 | 3.0 | 2.5 | 0.3 | 1.5 |
| L.S.T.P. | 49.5 | 50.4 | 45.6 | 0.4 | 30.0 | 50.1 | 36.2 |
| C5-C6 | 25.0 | 26.9 | 20.7 | 27.6 | 19.4 | 13.5 | 13.5 |
| LT. WAXY GASO. | 8.6 | 6.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LT. CAT. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EUN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 99.9 | 100.0 | 100.0 | 99.9 | 100.0 | 100.0 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|------------------|--------|--------|--------|--------|--------|--------|--------|
| GRAVITY API | 53.7 | 53.2 | 57.0 | 55.2 | 54.9 | 56.2 | 56.1 |
| R.V.P. | 9.0 | 8.4 | 11.8 | 8.6 | 7.2 | 8.8 | 8.5 |
| V/L RATIO | 5.6 | 5.4 | 2.2 | 5.5 | 6.4 | 6.2 | 6.6 |
| 30 DAY AVE | 12.7 | 8.9 | 5.0 | 5.1 | 5.3 | 5.5 | 5.7 |
| 10 PCT POINT | 123.0 | 121.0 | 106.0 | 127.0 | 127.0 | 121.0 | 121.0 |
| MAX DEG.F BLEND | 416.0 | 409.0 | 418.0 | 392.0 | 414.0 | 424.0 | 406.0 |
| 30 DAY AVE | 419.2 | 416.7 | 413.0 | 409.3 | 410.0 | 413.0 | 410.8 |
| W.U.F. BLEND | 131.9 | 133.1 | 143.3 | 139.9 | 142.8 | 143.0 | 146.2 |
| 30 DAY AVE | 132.2 | 131.6 | 133.8 | 134.8 | 136.0 | 137.5 | 140.8 |
| EVAP. AT 300 F | 76.9 | 77.3 | 78.8 | 81.1 | 80.5 | 77.8 | 79.3 |
| RECOVERY PCT | 95.8 | 96.0 | 95.0 | 97.3 | 96.2 | 97.0 | 97.0 |
| RESIDUE PCT | 1.2 | 1.7 | 1.2 | 1.3 | 1.3 | 1.4 | 1.5 |
| RSH PPM | 1.200 | 1.000 | 0.800 | 1.000 | 2.500 | 1.300 | 0.600 |
| 30 DAY AVE | 1.458 | 1.152 | 1.060 | 1.049 | 1.265 | 1.273 | 1.142 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 3.79 | 3.96 | 3.10 | 3.52 | 2.97 | 2.93 | 2.77 |
| PCT TML | 80.65 | 80.39 | 78.62 | 79.75 | 76.58 | 79.70 | 79.78 |
| KRR BLEND | 99.51 | 99.50 | 99.51 | 99.52 | 99.40 | 99.00 | 99.01 |
| 30 DAY AVE | 99.51 | 99.50 | 99.50 | 99.50 | 99.49 | 99.38 | 99.17 |
| KRM | 91.24 | 91.12 | 92.13 | 91.49 | 91.59 | 91.56 | 91.49 |
| 3AD OCTANE BLND | 99.93 | 99.74 | 100.24 | 100.50 | 100.60 | 100.59 | 100.56 |
| 30 DAY AVE | 100.19 | 99.98 | 99.88 | 99.98 | 100.08 | 100.19 | 100.33 |
| OXID. STAB. MIN. | 270.00 | 270.00 | 270.00 | 270.00 | 270.00 | 270.00 | 270.00 |
| GUMS,EX.MG/100ML | 0.60 | 0.40 | 0.40 | 0.60 | 0.60 | 0.40 | 0.40 |
| SULFUR | 0.022 | 0.027 | 0.021 | 0.026 | 0.026 | 0.022 | 0.017 |

| SUPER TOP GASOLINE | | | | | | | | PRODUCTS RECD. | |
|-------------------------|---------|---------|---------|--------|--------|--------|--------|----------------|--|
| BLEND NUMBER | 63 | 69 | 82 | 81 | 83 | 84 | 85 | | |
| JK NUMBER | 243 | 243 | 1004 | 243 | 1004 | 243 | 1004 | | |
| DATE COMPLETED | 3-11-73 | 3-20-73 | 3-31-73 | 4-1-73 | 4-4-73 | 4-7-73 | 4-9-73 | | |
| BARRELS BLENDED | 29972. | 29872. | 29382. | 29317. | 31543. | 36801. | 53083. | | |
| GRADE OF BLEND | W | W | W | W | W | W | W | | |
| V/L TEMPERATURE | 122. | 132. | 132. | 132. | 132. | 132. | 132. | | |
| COMPOSITION (VOL. PCT.) | | | | | | | | | |
| ALK | 30.9 | 30.3 | 28.2 | 30.0 | 5.1 | 4.0 | 4.3 | | |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| REFORMATE | 42.1 | 44.5 | 42.9 | 44.2 | 50.0 | 50.1 | 49.0 | | |
| BUTANE | 3.0 | 0.5 | 5.7 | 1.1 | 2.9 | 1.0 | 1.5 | | |
| S.T.P. | 24.1 | 24.7 | 23.2 | 24.7 | 10.1 | 12.0 | 12.5 | | |
| C5-C8 | 0.0 | 0.0 | 0.0 | 0.0 | 31.9 | 32.8 | 32.7 | | |
| L.T. WAXY GASO. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| L.T. CAT. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| LUN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| TOTAL | 100.1 | 100.0 | 100.0 | 100.0 | 100.0 | 99.9 | 100.0 | | |
| BLEND QUALITY | | | | | | | | | |
| GRAVITY API | 54.4 | 53.9 | 54.9 | 54.0 | 56.5 | 55.0 | 56.3 | | |
| 2.V.P. | 8.6 | 7.2 | 8.8 | 7.5 | 9.5 | 7.8 | 8.0 | | |
| V/L RATIO | 2.2 | 1.4 | 11.0 | 1.1 | 10.8 | 1.4 | 1.2 | | |
| 30 DAY AVE | 7.8 | 8.3 | 6.8 | 5.8 | 5.1 | 4.4 | 4.7 | | |
| 10 PCT POINT | 127.0 | 135.0 | 117.0 | 136.0 | 124.0 | 134.0 | 125.0 | | |
| MAX DEG.F BLEND | 384.0 | 388.0 | 410.0 | 394.0 | 370.0 | 375.0 | 364.0 | | |
| 30 DAY AVE | 386.9 | 389.5 | 391.9 | 391.4 | 386.3 | 386.6 | 381.2 | | |
| U.U.F. BLEND | 136.9 | 131.5 | 151.1 | 131.2 | 140.7 | 139.8 | 152.5 | | |
| 30 DAY AVE | 139.0 | 138.6 | 139.2 | 136.9 | 136.8 | 138.2 | 141.6 | | |
| EVAP. AT 300 F | 85.2 | 84.1 | 81.1 | 84.3 | 83.4 | 86.3 | 88.7 | | |
| RECOVERY PCT | 97.0 | 97.0 | 97.5 | 97.0 | 96.8 | 97.2 | 97.1 | | |
| RESIDUE PCT | 1.4 | 1.4 | 1.4 | 1.2 | 1.2 | 1.2 | 1.2 | | |
| ASH PPM | 1.400 | 1.500 | 1.000 | 1.800 | 0.800 | 0.300 | 0.800 | | |
| 30 DAY AVE | 1.131 | 1.095 | 0.943 | 1.071 | 1.184 | 1.098 | 1.032 | | |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | | |
| LEAD GR/GAL | 1.70 | 1.78 | 1.94 | 1.83 | 1.96 | 2.22 | 2.54 | | |
| PCT TML | 79.74 | 79.73 | 72.64 | 80.05 | 78.94 | 79.85 | 79.72 | | |
| RR BLEND | 99.01 | 99.01 | 99.00 | 99.02 | 99.00 | 99.00 | 99.01 | | |
| 30 DAY AVE | 99.01 | 99.02 | 99.00 | 99.00 | 99.00 | 99.00 | 99.00 | | |
| CRM | 91.79 | 91.56 | 91.54 | 91.51 | 91.96 | 91.70 | 91.73 | | |
| 100 OCTANE BLND | 100.44 | 100.49 | 100.40 | 100.33 | 100.51 | 100.53 | 100.57 | | |
| 10 DAY AVE | 100.43 | 100.46 | 100.46 | 100.44 | 100.42 | 100.45 | 100.47 | | |
| OXID. STAB. MIN. | 270.00 | 270.00 | 270.00 | 270.00 | 270.00 | 270.00 | 270.00 | | |
| SUMS, EX. MG/100ML | 0.40 | 0.20 | 0.20 | 0.30 | 0.60 | 0.00 | 0.40 | | |
| SULFUR | 0.003 | 0.003 | 0.021 | 0.002 | 0.006 | 0.001 | 0.001 | | |

REGULAR 76 GASOLINE LEVELS SAN FRANCISCO REFINERY PRODUCTS REPORT

| POD NUMBER | 80 | 88 | 87 | 39 | 94 | 97 | 96 |
|-----------------|---------|--------|--------|--------|---------|---------|---------|
| TANK NUMBER | 1001 | 1001 | 236 | 1001 | 287 | 288 | 28 |
| DATE COMPLETED | 3-30-73 | 4-4-73 | 4-6-73 | 4-7-73 | 4-11-73 | 4-12-73 | 4-18-73 |
| BARRELS BLENDED | 48664. | 19532. | 40449. | 19370. | 47921. | 29006. | 33675. |
| GRADE OF BLEND | LW | LW | LW | LW | LW | LW | LW |
| V/L TEMPERATURE | 132. | 132. | 132. | 132. | 132. | 132. | 132. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|
| LAR LT. CAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LT. XAXY GASO. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| C5-C6 | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| L.S.T.P. | 51.3 | 23.7 | 45.8 | 30.8 | 31.5 | 49.2 | 34.1 |
| BUTANE | 2.4 | 2.4 | 2.0 | 0.0 | 0.0 | 1.5 | 0.0 |
| LUN | 30.5 | 44.7 | 30.6 | 45.1 | 47.7 | 30.3 | 48.1 |
| H.S.T.P. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 15.9 | 29.2 | 20.6 | 23.1 | 20.7 | 18.8 | 17.7 |
| L.U.N. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 100.1 | 100.0 | 100.0 | 100.0 | 99.9 | 100.1 | 100.1 |

BLEND QUALITY

| | | | | | | | |
|-------------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 58.4 | 59.7 | 55.5 | 59.6 | 59.8 | 55.3 | 58.7 |
| R.V.P. | 10.4 | 10.0 | 7.6 | 8.9 | 8.8 | 7.5 | 9.0 |
| V/L RATIO | 19.0 | 18.4 | 1.8 | 85.8 | 11.4 | 2.2 | 8.5 |
| 30 DAY AVE | 7.7 | 7.7 | 6.8 | 12.0 | 13.3 | 12.2 | 13.3 |
| 10 PCT POINT | 113.0 | 118.0 | 132.0 | 121.0 | 117.0 | 128.0 | 120.0 |
| MAX DEG.F BLEND | 407.0 | 392.0 | 400.0 | 388.0 | 392.0 | 409.0 | 398.0 |
| 30 DAY AVE | 405.0 | 403.7 | 403.2 | 402.2 | 399.5 | 400.4 | 398.6 |
| W.U.F. BLEND | 153.6 | 167.9 | 135.6 | 167.9 | 172.3 | 133.2 | 162.1 |
| 30 DAY AVE | 149.7 | 149.5 | 147.5 | 148.8 | 152.6 | 150.8 | 153.0 |
| EVAP. AT 300 F | 81.8 | 96.0 | 79.9 | 85.8 | 85.1 | 79.1 | 83.1 |
| RECOVERY PCT | 96.2 | 96.0 | 97.5 | 97.0 | 97.2 | 96.6 | 97.0 |
| RESIDUE PCT | 1.4 | 2.0 | 1.6 | 1.5 | 1.2 | 0.0 | 1.4 |
| RSR PPM | 1.600 | 0.700 | 0.800 | 1.300 | 0.800 | 0.600 | 1.200 |
| 30 DAY AVE | 0.838 | 0.838 | 0.832 | 0.863 | 0.966 | 0.932 | 1.022 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.4 | 1.0 |
| LEAD GR/GAL | 0.52 | 0.55 | 0.52 | 0.53 | 0.54 | 0.53 | 0.54 |
| 30 DAY AVE | 0.52 | 0.52 | 0.52 | 0.52 | 0.53 | 0.53 | 0.53 |
| CCR BLEND | 93.81 | 93.56 | 93.92 | 93.83 | 93.80 | 94.26 | 93.85 |
| 30 DAY AVE | 93.98 | 93.96 | 93.95 | 93.94 | 93.93 | 93.96 | 93.97 |
| BLEND | 86.80 | 86.59 | 86.06 | 86.98 | 86.86 | 86.12 | 86.83 |
| ROAD OCT. BLEND | 93.27 | 93.16 | 92.70 | 93.40 | 93.30 | 92.75 | 93.29 |
| 30 DAY AVE | 93.02 | 92.97 | 92.93 | 92.96 | 93.01 | 92.99 | 93.04 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUHS, EX.MG/100ML | 0.20 | 0.40 | 0.20 | 0.20 | 0.20 | 0.40 | 0.40 |
| SULFUR | 0.003 | 0.007 | 0.002 | 0.002 | 0.004 | 0.007 | 0.002 |

EXCHANGE SUB - REG. N **SAN FRANCISCO REFINERY** **PRODUCTS REPORT**

| | | | | | | | |
|-----------------|---------|---------|--------|---------|--------|---------|--------|
| BLEND NUMBER | 90 | 100 | 113 | 125 | 139 | 149 | 161 |
| TANK NUMBER | 1003 | 1010 | 1010 | 1003 | 1003 | 1003 | 1003 |
| DATE COMPLETED | 4-10-73 | 4-21-73 | 5-3-73 | 5-18-73 | 6-9-73 | 6-18-73 | 7-8-73 |
| BARRELS BLENDED | 57776. | 24048. | 23409. | 24083. | 23860. | 74424. | 48206. |
| GRADE OF BLEND | W | W | W | W | W | W | W |
| V/L TEMPERATURE | 132. | 132. | 132. | 132. | 140. | 140. | 140. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|--------------|--------------|--------------|-------------|--------------|--------------|-------------|
| L.S.T.P. | 48.1 | 54.3 | 48.9 | 42.6 | 47.1 | 38.0 | 39.2 |
| LT. WAXY GASO. | 51.9 | 38.2 | 46.2 | 54.2 | 50.3 | 60.2 | 59.8 |
| C5-C6 | 0.0 | 6.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LUN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BUTANE | 0.0 | 1.3 | 4.9 | 3.1 | 2.7 | 1.9 | 0.7 |
| LUK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 100.0 | 100.0 | 100.0 | 99.9 | 100.1 | 100.1 | 99.9 |

BLEND QUALITY

| | | | | | | | |
|-------------------|--------|--------|--------|--------|--------|--------|--------|
| GRAVITY API | 59.8 | 58.0 | 57.8 | 58.9 | 58.6 | 60.8 | 60.5 |
| R.V.P. | 8.8 | 8.1 | 8.7 | 8.5 | 8.7 | 7.1 | 8.3 |
| V/L RATIO | 9.5 | 4.7 | 5.4 | 7.0 | 16.0 | 17.2 | 18.2 |
| 30 DAY AVE | 6.8 | 6.9 | 7.4 | 5.7 | 11.4 | 16.9 | 17.3 |
| 10 PCT POINT | 125.0 | 129.0 | 131.0 | 127.0 | 134.0 | 131.0 | 129.0 |
| MAX DEG.F BLEND | 413.0 | 418.0 | 423.0 | 412.0 | 414.0 | 408.0 | 400.0 |
| 30 DAY AVE | 410.4 | 411.4 | 416.3 | 417.6 | 412.9 | 409.4 | 406.3 |
| W.U.F. BLEND | 164.9 | 149.2 | 140.8 | 155.0 | 151.1 | 166.8 | 159.5 |
| 30 DAY AVE | 162.7 | 161.7 | 155.9 | 148.4 | 153.0 | 162.9 | 161.8 |
| EVAP. AT 300 F | 83.5 | 81.2 | 80.0 | 82.5 | 81.5 | 84.1 | 84.9 |
| RECOVERY PCT | 97.0 | 96.0 | 96.8 | 96.2 | 97.8 | 97.1 | 97.0 |
| RESIDUE PCT | 1.3 | 1.4 | 1.2 | 1.3 | 1.2 | 1.4 | 1.1 |
| RSH PPM | 1.500 | 0.800 | 1.000 | 1.000 | 0.400 | 0.500 | 0.600 |
| 30 DAY AVE | 2.021 | 1.469 | 1.228 | 0.932 | 0.701 | 0.475 | 0.516 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 1.67 | 1.75 | 1.76 | 1.98 | 1.76 | 2.36 | 2.39 |
| KRR BLEND | 91.10 | 91.00 | 91.11 | 91.03 | 91.01 | 91.00 | 91.01 |
| 30 DAY AVE | 91.07 | 91.05 | 91.07 | 91.04 | 91.02 | 91.00 | 91.00 |
| KRM BLEND | 86.19 | 86.15 | 85.98 | 86.32 | 86.05 | 87.17 | 86.83 |
| R + KRM | 177.29 | 177.15 | 177.09 | 177.35 | 177.06 | 178.17 | 177.84 |
| 30 DAY AVE | 177.11 | 177.17 | 177.21 | 177.19 | 177.20 | 177.90 | 177.88 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS, EX.MG/100ML | 0.60 | 0.40 | 0.40 | 0.20 | 0.20 | 0.40 | 0.60 |
| SULFUR | 0.004 | 0.001 | 0.001 | 0.003 | 0.001 | 0.002 | 0.003 |

REGULAR 76 GASOLINE UW SAN FRANCISCO REFINERY PRODUCTS REPORT

| BLEND NUMBER | 56 | 59 | 63 | 68 | 71A | 75 | 78 |
|-----------------|---------|---------|---------|--------|---------|---------|---------|
| ANK NUMBER | 1002 | 1002 | 1001 | 1001 | 1001 | 1001 | 1001 |
| DATE COMPLETED | 3-21-74 | 3-24-74 | 3-31-74 | 4-7-74 | 4-10-74 | 4-14-74 | 4-22-74 |
| BARRELS BLENDED | 50090. | 35586. | 65946. | 50027. | 42074. | 29976. | 59800. |
| GRADE OF BLEND | W | W | W | W | W | W | W |
| V/L TEMPERATURE | 132. | 132. | 132. | 132. | 132. | 132. | 132. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|-------|------|-------|-------|-------|-------|------|
| LAR LT. CAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LT. WAXY GASO. | 20.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| C5-C6 | 0.0 | 0.0 | 0.0 | 0.0 | 20.1 | 7.6 | 1.9 |
| L.S.T.P. | 0.0 | 24.0 | 18.6 | 15.1 | 0.0 | 0.0 | 15.8 |
| BUTANE | 4.3 | 3.7 | 3.1 | 3.2 | 4.0 | 3.3 | 4.1 |
| LUR | 9.0 | 31.3 | 31.3 | 32.0 | 13.2 | 30.8 | 29.2 |
| H.S.T.P. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 66.6 | 40.9 | 47.0 | 49.7 | 62.7 | 58.3 | 48.9 |
| TOTAL | 100.0 | 99.9 | 100.0 | 100.0 | 100.0 | 100.0 | 99.9 |

BLEND QUALITY

| | | | | | | | |
|-------------------|-------|-------|-------|-------|-------|-------|-------|
| GRAVITY API | 50.7 | 52.0 | 53.4 | 53.9 | 53.7 | 54.1 | 53.4 |
| R.V.P. | 9.1 | 7.2 | 8.8 | 8.8 | 8.7 | 9.0 | 8.7 |
| V/L RATIO | 7.6 | 8.0 | 5.3 | 6.2 | 8.2 | 7.4 | 6.6 |
| 30 DAY AVE | 8.3 | 8.3 | 7.5 | 7.3 | 7.0 | 6.9 | 6.6 |
| 10 PCT POINT | 129.0 | 126.0 | 129.0 | 122.0 | 129.0 | 127.0 | 132.0 |
| MAX DEG.F BLEND | 345.0 | 362.0 | 369.0 | 363.0 | 359.0 | 361.0 | 368.0 |
| 30 DAY AVE | 355.3 | 356.6 | 359.8 | 360.3 | 360.0 | 360.1 | 364.5 |
| W.U.F. BLEND | 123.8 | 127.7 | 134.5 | 139.8 | 137.1 | 137.8 | 129.3 |
| 30 DAY AVE | 127.2 | 127.3 | 129.2 | 130.9 | 131.6 | 133.3 | 134.2 |
| EVAP. AT 300 F | 90.5 | 88.3 | 86.9 | 86.2 | 87.5 | 87.9 | 85.5 |
| RECOVERY PCT | 96.0 | 96.0 | 96.8 | 97.0 | 97.0 | 97.0 | 97.0 |
| RESIDUE PCT | 1.1 | 1.2 | 1.1 | 1.3 | 1.2 | 1.0 | 1.2 |
| RSH PPM | 0.600 | 0.700 | 2.000 | 2.000 | 1.200 | 1.100 | 1.400 |
| 30 DAY AVE | 1.166 | 1.076 | 1.318 | 1.431 | 1.318 | 1.353 | 1.491 |
| CURR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 DAY AVE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KRR BLEND | 96.19 | 95.50 | 95.04 | 94.91 | 94.90 | 94.99 | 94.92 |
| KRM BLEND | 85.36 | 85.21 | 85.18 | 85.13 | 85.50 | 85.31 | 85.47 |
| KRR+KRM/2 | 90.77 | 90.35 | 90.11 | 90.02 | 90.20 | 90.15 | 90.14 |
| 30 DAY AVE | 90.50 | 90.47 | 90.38 | 90.32 | 90.30 | 90.26 | 90.15 |
| AD OCT. BLEND | 91.70 | 91.56 | 91.54 | 91.50 | 91.78 | 91.63 | 91.75 |
| 30 DAY AVE | 91.65 | 91.63 | 91.60 | 91.59 | 91.62 | 91.61 | 91.62 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS, EX.MG/100ML | 0.20 | 0.40 | 0.20 | 0.40 | 0.20 | 0.00 | 0.00 |
| SULFUR | 0.009 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| EXCHANGE REGULAR | | SAN FRANCISCO REFINERY | | PRODUCTS REPORT | | |
|-------------------|--------|------------------------|---------|-----------------|---------|---------|
| BLEND NUMBER | 120 | 128 | 131 | 143 | 151 | 157 |
| WORK NUMBER | 1003 | 1006 | 1003 | 1006 | 1003 | 1006 |
| DATE COMPLETED | 6-6-74 | 6-16-74 | 6-23-74 | 7-3-74 | 7-10-74 | 7-19-74 |
| BARRELS BLENDED | 49819. | 40253. | 53379. | 48993. | 49050. | 48808. |
| GRADE OF BLEND | | | | | | |
| V/L TEMPERATURE | 140. | 140. | 140. | 140. | 140. | 140. |
| L.S.T.P. | 47.3 | 63.4 | 70.0 | 52.3 | 58.5 | 58.8 |
| LT. WAXY GASO. | 46.4 | 33.5 | 26.4 | 45.7 | 39.0 | 39.0 |
| C5-C6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LUN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BUTANE | 1.5 | 3.1 | 3.6 | 2.0 | 2.5 | 2.2 |
| LUK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ALKYLATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REFORMATE | 4.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TOTAL | 99.9 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| BLEND QUALITY | | | | | | |
| VIT. API | 60.1 | 58.3 | 57.4 | 60.4 | 58.9 | 59.3 |
| R.S.P. | 7.5 | 8.9 | 8.6 | 8.6 | 8.9 | 8.8 |
| V/L RATIO | 19.2 | 17.6 | 12.6 | 17.0 | 16.4 | 19.4 |
| 30 DAY AVE | 10.8 | 12.1 | 12.7 | 16.4 | 15.7 | 16.2 |
| 10 PCT POINT | 129.0 | 133.0 | 133.0 | 132.0 | 128.0 | 127.0 |
| MAX DEG.F BLEND | 391.0 | 392.0 | 394.0 | 383.0 | 390.0 | 406.0 |
| 30 DAY AVE | 388.8 | 387.9 | 389.1 | 390.0 | 389.7 | 393.2 |
| W.U.F. BLEND | 166.9 | 148.6 | 140.4 | 158.1 | 152.2 | 161.6 |
| 30 DAY AVE | 165.4 | 164.9 | 159.1 | 153.4 | 149.6 | 152.7 |
| EVAP. AT 300 F | 85.8 | 83.0 | 82.9 | 84.8 | 83.9 | 83.2 |
| RECOVERY PCT | 97.0 | 96.8 | 96.3 | 96.2 | 96.3 | 97.0 |
| RESIDUE PCT | 1.3 | 1.3 | 1.2 | 1.5 | 1.5 | 1.3 |
| RSH PPM | 0.400 | 0.600 | 0.900 | 1.600 | 1.500 | 1.400 |
| 30 DAY AVE | 0.828 | 0.799 | 0.789 | 0.886 | 1.169 | 1.340 |
| CORR.3HR AT 122F | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LEAD GR/GAL | 2.57 | 2.31 | 1.88 | 2.50 | 2.09 | 2.21 |
| KRR BLEND | 93.02 | 93.01 | 93.01 | 93.03 | 92.97 | 93.00 |
| 30 DAY AVE | 93.01 | 93.01 | 93.01 | 93.01 | 93.00 | 93.00 |
| KRM BLEND | 88.65 | 87.97 | 87.23 | 88.69 | 87.83 | 87.57 |
| KRR + KRM | 181.67 | 180.98 | 180.24 | 181.72 | 180.80 | 180.57 |
| 30 DAY AVE | 181.84 | 181.67 | 181.30 | 181.14 | 180.91 | 180.81 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS, EX.MG/100ML | 0.20 | 0.20 | 0.40 | 0.40 | 0.40 | 0.20 |
| SULFUR | 0.004 | 0.003 | 0.001 | 0.002 | 0.003 | 0.003 |

REGULAR 76 GASOLINE UW SAN FRANCISCO REFINERY PRODUCTS REPORT

| BLEND NUMBER | 105 | 111 | 113 | 119 | 121 | 123 | 124 |
|-----------------|---------|---------|---------|--------|--------|--------|---------|
| ANK NUMBER | 1001 | 288 | 287 | 1001 | 288 | 287 | 288 |
| DATE COMPLETED | 5-21-77 | 5-26-77 | 5-30-77 | 6-2-77 | 6-4-77 | 6-7-77 | 6-10-77 |
| BARRELS BLENDED | 79345. | 79197. | 59542. | 39576. | 44527. | 70717. | 69361. |
| GRADE OF BLEND | W | W | W | W | W | W | W |
| V/L TEMPERATURE | 140. | 140. | 140. | 140. | 140. | 140. | 140. |

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| BUTANE | 1.4 | 2.0 | 1.9 | 2.6 | 3.3 | 2.8 | 2.6 |
| C5-C6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LT. WAXY GASO. | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| LUK | 34.8 | 37.4 | 38.4 | 36.0 | 38.1 | 36.5 | 32.0 |
| REFORMATE (101) | 57.4 | 54.5 | 55.1 | 55.4 | 57.3 | 55.6 | 53.8 |
| PLAT (97) | 6.5 | 6.1 | 4.6 | 6.0 | 1.3 | 5.1 | 11.6 |
| TOTAL | 100.1 | 100.0 | 100.0 | 100.1 | 100.0 | 100.0 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|--------------------|--------|--------|--------|--------|--------|--------|--------|
| GRAVITY (API) | 52.20 | 53.00 | 52.80 | 52.30 | 53.30 | 52.50 | 51.80 |
| 10 PCT POINT | 125.00 | 121.00 | 125.00 | 125.00 | 119.00 | 128.00 | 127.00 |
| 50 PCT POINT | 233.00 | 227.00 | 229.00 | 232.00 | 223.00 | 231.00 | 238.00 |
| 90 PCT POINT | 339.00 | 336.00 | 333.00 | 335.00 | 332.00 | 336.00 | 339.00 |
| R.V.P. | 8.40 | 8.90 | 8.50 | 8.80 | 8.60 | 7.40 | 9.00 |
| 30 DAY AVE | 8.68 | 8.70 | 8.72 | 8.76 | 8.75 | 8.55 | 8.57 |
| V/L RATIO | 14.40 | 17.70 | 15.80 | 13.20 | 15.60 | 16.80 | 14.80 |
| 30 DAY AVE | 10.18 | 11.95 | 12.91 | 13.41 | 13.57 | 14.21 | 14.28 |
| MAX DEG.F BLEND | 415.00 | 411.00 | 406.00 | 408.00 | 405.00 | 406.00 | 413.00 |
| 30 DAY AVE | 413.83 | 414.59 | 414.27 | 414.38 | 413.67 | 412.42 | 411.93 |
| W.O.N. BLEND | 407.90 | 399.05 | 401.80 | 415.00 | 392.75 | 406.23 | 413.80 |
| 30 DAY AVE | 392.49 | 389.56 | 389.04 | 392.19 | 392.23 | 395.92 | 400.04 |
| RECOVERY PCT | 97.00 | 96.50 | 97.00 | 97.00 | 97.00 | 96.00 | 96.00 |
| RESIDUE PCT | 1.10 | 1.30 | 1.20 | 1.30 | 1.30 | 1.10 | 1.30 |
| CORR. 3HR AT 122F | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| MN (GR/GAL) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 DAY AVE | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.00 |
| KRR BLEND | 95.32 | 95.28 | 95.22 | 95.20 | 95.50 | 95.14 | 95.26 |
| KRM BLEND | 85.50 | 85.49 | 85.50 | 85.49 | 85.50 | 85.51 | 85.51 |
| KRR+KRM/2 | 90.41 | 90.38 | 90.36 | 90.34 | 90.50 | 90.32 | 90.38 |
| 30 DAY AVE | 90.29 | 90.24 | 90.24 | 90.25 | 90.27 | 90.25 | 90.26 |
| ROAD OCT. BLEND | 90.63 | 90.63 | 90.63 | 90.63 | 90.50 | 90.63 | 90.64 |
| 30 DAY AVE | 90.62 | 90.62 | 90.62 | 90.62 | 90.61 | 90.61 | 90.62 |
| OXID. STAB. MIN. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| GUMS, EX. MG/100ML | 0.00 | 0.20 | 0.00 | 0.20 | 0.20 | 0.00 | 0.20 |
| H (PPM) | 1.000 | 1.300 | 1.000 | 1.300 | 1.800 | 0.400 | 0.600 |
| 30 DAY AVE | 1.116 | 1.146 | 1.146 | 1.134 | 1.184 | 1.059 | 0.971 |
| LEAD | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.000 |

HPIGAREP
1419 04/19/78

EXCHANGE, REGULAR SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER 47 59A 71 74 85 93 105
TANK NUMBER 60 61 60 60 61 61 104
DATE COMPLETED 2-14-78 3-3-78 3-13-78 3-19-78 3-28-78 4-6-78 4-15-78
BARRELS BLENDED 40307. 38679. 29591. 25518. 29838. 33892. 52725.
GRADE OF BLEND
V/L TEMPERATURE 116. 116. 124. 124. 124. 124. 124.

COMPOSITION (VOL. PCT.)

| | | | | | | | |
|----------------|--------------|-------------|--------------|--------------|--------------|--------------|--------------|
| BUTANE | 5.9 | 6.7 | .0 | .2 | 2.0 | .0 | 3.5 |
| CS-C6 | 46.4 | 4.1 | 52.2 | 22.9 | .0 | 19.8 | 21.7 |
| LT. MAXY GASO. | .0 | 21.8 | .0 | .0 | 26.9 | 33.4 | .0 |
| LUK | .0 | .0 | .0 | .0 | .0 | .0 | .0 |
| REFORMATE | .0 | .0 | .0 | .0 | .0 | .0 | .0 |
| PLAT | 47.7 | 67.3 | 47.8 | 76.9 | 71.3 | 46.8 | 74.8 |
| LAR REFORMATE | .0 | .0 | .0 | .0 | .0 | .0 | .0 |
| TOTAL | 100.0 | 99.9 | 100.0 | 100.0 | 100.1 | 100.0 | 100.0 |

BLEND QUALITY

| | | | | | | | |
|--------------------|--------|--------|--------|--------|--------|--------|--------|
| GRAVITY (API) | 60.60 | 55.90 | 60.20 | 59.60 | 54.40 | 57.60 | 56.40 |
| 10 PCT POINT | 113.00 | 113.00 | 126.00 | 115.00 | 134.00 | 120.00 | 131.00 |
| 50 PCT POINT | 201.00 | 226.00 | 207.00 | 206.00 | 238.00 | 210.00 | 228.00 |
| 90 PCT POINT | 325.00 | 339.00 | 325.00 | 326.00 | 338.00 | 323.00 | 338.00 |
| MAX DEG.F BLEND | 392.00 | 417.00 | 401.00 | 394.00 | 418.00 | 394.00 | 419.00 |
| 30 DAY AVE | 400.95 | 401.98 | 403.36 | 405.69 | 408.59 | 401.63 | 408.26 |
| R.V.P. | 11.60 | 11.40 | 9.80 | 8.30 | 8.40 | 7.50 | 8.90 |
| 30 DAY AVE | 11.49 | 11.69 | 11.04 | 10.05 | 9.66 | 8.47 | 8.35 |
| V/L RATIO | 12.00 | 9.60 | 5.40 | 2.80 | 2.20 | 1.10 | 2.80 |
| 30 DAY AVE | 9.98 | 11.53 | 9.35 | 6.42 | 5.43 | 2.82 | 2.27 |
| RECOVERY PCT | 95.00 | 95.00 | 96.00 | 97.00 | 96.00 | 96.50 | 97.00 |
| LEAD (GR/GAL) | 1.45 | 1.18 | 2.08 | 1.87 | 1.26 | 1.85 | 1.34 |
| 30 DAY AVE | 1.17 | 1.22 | 1.53 | 1.65 | 1.56 | 1.77 | 1.54 |
| KRR BLEND | 93.02 | 93.01 | 93.01 | 93.00 | 93.00 | 93.00 | 93.00 |
| 30 DAY AVE | 93.01 | 93.01 | 93.01 | 93.01 | 93.01 | 93.00 | 93.00 |
| KRM BLEND | 88.14 | 87.18 | 87.19 | 87.48 | 86.80 | 87.58 | 87.17 |
| KRR + KRM | 181.16 | 180.19 | 180.20 | 180.48 | 179.80 | 180.58 | 180.17 |
| 30 DAY AVE | 180.44 | 180.49 | 180.55 | 180.27 | 180.16 | 180.27 | 180.25 |
| RESIDUE PCT | 1.20 | 1.20 | 1.20 | 1.10 | 1.20 | 1.10 | 1.10 |
| CORR.3HR AT 122F | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| SUMS, EX. MG/100ML | .20 | .20 | .20 | .20 | .20 | .20 | .20 |
| RSH (PPM) | .400 | .600 | .400 | .500 | .300 | .300 | .400 |
| 30 DAY AVE | .416 | .471 | .471 | .510 | .460 | .368 | .374 |
| SULFUR | .000 | .000 | .000 | .000 | .000 | .000 | .000 |

LOS ANGELES REFINERY PRODUCTS REPORT

PAGE 1

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80-67 AVIATION GASOLINE

| BLEND NUMBER | SPEC SHEET | 019 | 120 | 175 | 222 | 279 | 357 | 393 | 425 |
|------------------------------|-------------|----------|----------|----------|---------------|----------|----------|----------|--------|
| SAMPLE NUMBER | ALL-G-5522E | 0 62 | 62 | 62 | 0 346 | 0 346 | 62 | 662 | 6348 |
| DATE BLEND COMPLETED | DATED | 500 | 1578 | 2249 | 2643 | 3361 | 4276 | 4729 | 5111 |
| DARRELS BLENDED | A-1-79 | 02/05/62 | 04-21-62 | 06/03/62 | 0704 08/19/62 | 10-17-62 | 11/20/62 | 12/18/62 | |
| UNFINED CS/C6 | | 10.0 | 9.9 | 10.9 | 12.4 | 9.9 | 17.2 | 10.0 | 10.0 |
| 1133 AVIA BASE STOCK | | 28.6 | 25.6 | 29.1 | 25.6 | 27.3 | 26.3 | 29.1 | 25.6 |
| ULV LITE ALKY | | 30.4 | 32.4 | 32.3 | 29.3 | 29.8 | 31.4 | 27.8 | |
| ULV REFORMATE | | 40.8 | 56.2 | 38.5 | 41.9 | 43.4 | 41.9 | 39.5 | 46.0 |
| GRAVITY API 60 F. | | 66.5 | 65.6 | 67.0 | 67.2 | 67.2 | 66.6 | 67.0 | 67.4 |
| COLLUM SATOUL | RED | RED | RED | RED | RED | RED | RED | RED | RED |
| DUCTURE TEST | | NEG | NEG | NEG | NEG | NEG | NEG | NEG | NEG |
| CARBONIZATION 2 HOURS 212 F. | 1 MAX | 1A | 1A | 1A | 1A | 1A | 1A | 1A | 1A |
| WATER AND SUSPENDED MATTER | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE |
| VAPOR PRESSURE | 5.5-7.0 | 6.6 | 6.7 | 6.7 | 6.7 | 6.7 | 6.6 | 6.7 | 6.6 |
| GUMS AIR JET MG/100 ML | 3.0 MAX | 0.2 | 0.2 | 0.2 | 0.4 | 0.2 | 0.4 | 0.4 | 1.0 |
| GUMS POT AIN JET MG/100 ML | 6.0 MAX | 2.3 | 1.4 | 1.4 | 2.2 | 2.9 | 0.0 | 0.4 | 5.7 |
| GUMS POT PRECIP MG/100 ML | 2.0 MAX | 0.1 | 1.0 | 0.6 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| ANILINE POINT AIN SIM USE F | | 136.5 | 132.0 | 137.0 | 136.0 | 139.3 | 136.0 | 136.5 | 140.5 |
| ANILINE GRAVITY CONSTANT | 7500 MIN | 1a | 9077 | 6606 | 9179 | 9274 | 9361 | 9218 | 9470 |
| WATER REACT INTERFACE RT | 2 MAX | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WATER REACT SEPARATION HIG | 2 MAX | 18 | 18 | 18 | 18 | 18 | 1 | 18 | 18 |
| FREEZING POINT DEGREES F | 76 MAX | **-112 | **-116 | **-112 | **-112 | **-112 | **-112 | **-112 | **-112 |
| SULFUR WEIGHT PCT | 0.05 MAX | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.01 |
| TEL ML/GAL CALC | 0.50 MAX | 0.92 | 0.36 | 0.41 | 0.40 | 0.41 | 0.40 | 0.42 | 0.39 |
| KR LEAN D-2700 | 60.0 MIN | 63.6 | 67.2 | 82.6 | 61.7 | 82.0 | 83.9 | 83.0 | 83.6 |
| SR. NICH | 67.0 MIN | 90.0 | 92.6 | 86.6 | 88.1 | 88.3 | 90.2 | 86.6 | 89.6 |
| EP DEGREES F | 338 MAX | 320 | 334 | 329 | 328 | 316 | 330 | 316 | 332 |
| RESIDUE VOL PCT | 1.5 MAX | 1.0 | 1.0 | 1.5 | 1.0 | 1.5 | 1.0 | 1.5 | 1.0 |
| LOSS PCT | 1.5 MAX | 1.0 | 1.0 | 1.5 | 1.0 | 1.5 | 1.0 | 1.5 | 1.0 |
| 10% EVAP DEGREES F | 167 MAX | 149 | 150 | 150 | 146 | 152 | 150 | 146 | 147 |
| 40% EVAP DEGREES F | 167 MIN | 191 | 196 | 192 | 190 | 192 | 193 | 187 | 191 |
| 50% EVAP DEGREES F | 221 MAX | 202 | 207 | 203 | 202 | 204 | 203 | 199 | 202 |
| 90% EVAP DEGREES F | 275 MAX | 268 | 275 | 272 | 267 | 271 | 263 | 272 | |
| SUM OF 10% & 50% EVAP | 307 MIN | 351 | 357 | 353 | 350 | 356 | 353 | 343 | 349 |

L2. HEAT OF COMBUSTION MAY BE MAILED IF AGC IS 7500 OR GREATER

DISTRIBUTION - SEN. Supt. OPER. SUPP. B.O. BLEND. FOREMAN. BLEND. ENGR. LABORATORY. 2

| | | | | | | | | | | |
|----------------------------|-------------|--------|---------|---------|--------|----------|----------|----------|----------|--------|
| BLEND NUMBER | SPEC SHEET | 9 | 36 | 64 | 80 | 104 | 131 | 157 | 174 | 228 |
| TANK NUMBER | MIL-G-5572E | 348 | 348 | 348 | 348 | 348 | 348 | 348 | 348 | 348 |
| SAMPLE NUMBER | | 77 | 420 | 726 | 911 | 1232 | 1527 | 1831 | 2050 | 2681 |
| DATE BLEND COMPLETED | DATED | 1-6-78 | 1-27-78 | 2-17-78 | 3-3-78 | 03-24-78 | 04-14-78 | 05-06-78 | 05-20-78 | 7/1/78 |
| BARRELS BLENDED | 07/01/72 | 6.0 | 6.5 | 9.0 | 12.3 | 7.4 | 7.9 | 10.4 | 11.9 | 11.0 |
| UNIFINED CS/C6 | | 30.0 | 27.7 | 30.7 | 30.3 | 14.1 | 26.2 | 32.0 | 31.0 | |
| UI10 LITE ALKY | | 53.3 | 63.1 | 52.9 | 50.8 | 67.0 | 53.0 | 53.4 | 50.0 | 49.1 |
| UI100 REFORMATE | | 16.7 | 9.2 | 16.4 | 16.9 | 18.9 | 18.0 | 18.4 | 18.0 | 19.1 |
| GRAVITY API 60 F. | | 64.6 | 65.5 | 65.6 | 65.2 | 65.0 | 65.0 | 65.0 | 65.0 | 64.3 |
| COLOR SAYBOLT | RED | RED | RED | RED | RED | RED | RED | RED | RED | RED |
| DOCTOR TEST | | NEG | NEG | NEG | NEG | NEG | NEG | NEG | NEG | NEG |
| CORROSION 2 HOURS 212 F. | 1 MAX | 1A | 1A | 1A | 1A | 1A | 1A | 1A | 1A | 1A |
| WATER AND SUSPENDED MATTER | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE |
| VAPOR PRESS REID | 5.5-7.0 | 6.4 | 6.5 | 6.8 | 6.3 | 6.2 | 6.3 | 6.5 | 6.7 | 6.9 |
| GUMS AIR JET MG/100 ML | 3.0 MAX | 0.2 | 0.4 | 0.4 | 0.2 | 0.4 | 0.4 | 0.4 | 0.4 | 0.2 |
| GUMS POT AIR JET MG/100 ML | 6.0 MAX | 1.9 | 2.5 | 1.1 | 1.5 | 0.8 | 1.0 | 0.7 | 1.0 | |
| GUMS POT PRECIP MG/100 ML | 2.0 MAX | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| ANILINE POINT ASTM DEG F | | 124.2 | 127.5 | 126.5 | 126.2 | 127.5 | 125.7 | 126.0 | 125.0 | 120.5 |
| ANILINE GRAVITY CONSTANT | 7500 MIN 1° | 8023 | A351 | 6298 | 6228 | 6313 | 6171 | 6190 | 6175 | 7748 |
| WATER REACT VOL CHANGE ML | 2 MAX | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WATER REACTION | 2 MAX | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| FREEZING POINT DEGREES F | -76 MAX | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 |
| SULFUR WEIGHT PCT | 0.05 MAX | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| TEL ML/GAL CALC | 0.50 MAX | 0.16 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| KR LEAN D-2700 | 60.0 MIN | 86.2 | 86.2 | 86.0 | 85.7 | 87.0 | 87.0 | 86.2 | 85.6 | 84.7 |
| KR RICH | 67.0 MIN | 94.2 | 89.5 | 88.3 | 87.8 | 94.1 | 94.6 | 93.7 | 92.6 | 91.9 |
| MAX DEGREES F | 338 MAX | 334 | 329 | 335 | 331 | 333 | 330 | 323 | 334 | 337 |
| RESIDUE PCT | 1.5 MAX | 1.0 | 1.5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LOSS PCT | 1.5 MAX | 1.0 | 1.5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| 10% EVAP DEGREES F | 167 MAX | 147 | 146 | 147 | 149 | 149 | 149 | 149 | 153 | 155 |
| 40% EVAP DEGREES F | 167 MIN | 189 | 190 | 188 | 192 | 200 | 194 | 197 | 193 | 190 |
| 50% EVAP DEGREES F | 221 MAX | 200 | 201 | 199 | 203 | 210 | 204 | 206 | 203 | 201 |
| 90% EVAP DEGREES F | 275 MAX | 270 | 265 | 264 | 267 | 267 | 265 | 263 | 265 | 263 |
| SUM OF 10% & 50% EVAP | 307 MIN | 347 | 347 | 346 | 352 | 359 | 353 | 359 | 353 | 353 |

1. MEAT OF COMBUSTION MAY BE WAIVED IF ACC IS 7500 OF GREATER

DISTRIBUTION - GEN.SUPT.OPER, SUPV.PROC.ENGR, BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

80/87 AVIATION GASOLINE

460

| | | | | | | | | | |
|--------------------------------------|-------------|----------|----------|----------|----------|---------|----------|----------|----------|
| TANK NUMBER | SPEC SHEET | 348 | 348 | 348 | 348 | 348 | 348 | 348 | 348 |
| SAMPLE NUMBER | MIL-G-5572E | 260 | 1631 | 2385 | 4226 | 4671 | 7576 | 7785 | 8064 |
| DATE BLEND COMPLETED | 65-71 DATED | 01-11-75 | 03-08-75 | 04-11-75 | 05-23-75 | 6-13-75 | 07-12-75 | 08-15-75 | 09-12-75 |
| BARRELS BLENDED | 07/01/72 | 15.9 | 13.0 | 14.4 | 14.9 | 14.9 | 14.7 | 14.8 | 14.9 |
| UBO UNFINED CS/CS | | 23.0 | | | | | | | |
| U33 AVIA BASE STOCK | 59.7 | 34.9 | 57.2 | 51.3 | 46.6 | 47.3 | 36.9 | 41.8 | 42.6 |
| U-110 LITE ALKY | 37.3 | 42.1 | 39.9 | 25.7 | 23.7 | 24.9 | 28.7 | 29.1 | 29.7 |
| BLENDING BUTANE | 3.0 | | 2.9 | | | | | | |
| U120 LT UNICRACKATE | | | | | | | | | |
| U100 REFORMATE | | | | | | | | | |
| INHIBITOR OXID LB/1000 PBL 8.9 MAX | 5.1 | 5.0 | 4.9 | 5.0 | 5.0 | 5.1 | 5.1 | 5.08 | 5.0 |
| GRAVITY API 60F | 67.0 | 69.4 | 68.1 | 68.1 | 67.3 | 66.7 | 64.1 | 66.0 | 67.6 |
| COLCR SAYBOLT RED | RED | REC | RED | RED | RED | RED | RED | RED | RED |
| DOCTOR TEST | NEG | NEG | MERC | NEG | NEG | NEG | NEG | NEG | NEG |
| CORROSION 2 HOURS 212F 1 MAX | 1A | 1A | 1A | 1A | 1A | 1A | 1A | 1A | 1A |
| WATER AND SUSPENDED MATTER NCNE | NCNE | NCNE | NCNE | NCNE | NCNE | NCNE | NCNE | NCNE | NCNE |
| VAPOR PRESS REIC LBS | 6.2 | 6.5 | 6.8 | 7.0 | 6.6 | 6.3 | 5.9 | 6.5 | 6.8 |
| GUMS AIR JET PG/100 ML | 3.0 MAX | 0.2 | 0.6 | 1.6 | 0.2 | 0.6 | 0.2 | 0.4 | 0.2 |
| GUMS AIR JET PG/100 ML 6.0 MAX | 3.0 | 0.6 | 2.4 | 1.2 | 2.8 | 2.5 | 1.6 | 2.5 | 2.2 |
| GUMS FOT PRECIP PG/100 ML 2.0 MAX | 0.1 | 0.1 | 0.4 | 0.6 | 0.2 | 0.2 | 0.0 | 0.3 | 0.0 |
| ANILINE POINT ASTM C66 F | 140.5 | 143.0 | 142.5 | 137.0 | 137.3 | 137.5 | 126.4 | 134.5 | 139.5 |
| ANILINE GRAVITY CONSTANT 7500 MIN 1* | 9526 | 9924 | 9704 | 9330 | 9240 | 9171 | 9102 | 8977 | 9427 |
| LATER REACT VCL CHANGE PL 2 MAX | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| LATER REACTION PL 2 MAX | 1 | 1 | 1 | 1 | 1 | 1 | 18 | 1 | 1 |
| FREEZING POINT DEGREES F -76 MAX | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 |
| SULFUR WEIGHT PCT | 0.05 MAX | 0.01 | 0.009 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| TEL ML/GAL CALC | 0.50 MAX | 0.42 | 0.38 | 0.38 | 0.38 | 0.42 | 0.41 | 0.38 | 0.38 |
| KR LEAN 0-2700 | 80.0 MIN | 82.6 | 81.4 | 83.0 | 81.9 | 81.6 | 80.9 | 82.5 | 81.0 |
| KR RICH | 87.0 MIN | 88.1 | 87.0 | 89.0 | 87.5 | 87.1 | 87.3 | 88.2 | 88.0 |
| PAX DEGREES F | 338 MAX | 295 | 299 | 297 | 284 | 302 | 295 | 310 | 300 |
| RESIDLE PCT | 1.5 MAX | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.5 | 1.0 |
| LOSS PCT | 1.5 MAX | 1.0 | 1.5 | 1.0 | 1.0 | 1.5 | 1.0 | 1.5 | 0.5 |
| 10PCT EVAPORATED DEG F | 167 MAX | 160 | 153 | 159 | 151 | 150 | 152 | 159 | 148 |
| 40PCT EVAPORATED DEG F | 167 MIN | 167 | 182 | 192 | 181 | 183 | 187 | 195 | 184 |
| 80PCT EVAP DEGREES F | 221 MAX | 192 | 190 | 199 | 189 | 191 | 196 | 204 | 196 |
| 90 EVAPORATED F | 275 MAX | 230 | 231 | 238 | 230 | 238 | 243 | 259 | 239 |
| SUM OF 10PCT & 80PCT EVAP 307 MIN | 352 | 345 | 358 | 340 | 341 | 348 | 363 | 344 | 342 |

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500

1* CR GREATER

LOS ANGELES REFINERY PRODUCTS REPORT

460

80/87 AVIATION GASOLINE

PAGE 2

| | | | | | | | | | |
|--------------------------------------|-------------|----------|----------|----------|----------|----------|----------|----------|----------|
| TANK NUMBER | SPEC SHEET | 348 | 8-348 | 348 | 348 | 348 | 348 | 348 | 348 |
| SAMPLE NUMBER | MIL-6-5572E | 5484 | 6618 | 7011 | 7289 | 0572 | 030 | 9356 | 346 |
| DATE BLEND COMPLETED | GS-71 UATED | 07-13-74 | 07-27-74 | 08-09-74 | 08-30-74 | 09-13-74 | 09-27-74 | 10-11-74 | 10-23-74 |
| BARKELLS BLENDING | 07/01/72 | 14.7 | 9.8 | 14.7 | 15.4 | 13.8 | 9.0 | 9.9 | 13.2 |
| U33 AVIA BASE STOCK | 57.6 | 58.3 | 56.9 | 56.2 | 56.1 | 56.0 | 57.7 | 56.9 | 12.9 |
| U80 KERONATE | | | | | | | | | 62.7 |
| U-110 LITE ALKY | 38.3 | 37.7 | 39.0 | 39.9 | 40.0 | 40.0 | 38.4 | 37.1 | 0.5 |
| BLENDING BUTANE | 4.1 | 4.0 | 4.1 | 3.9 | 3.9 | 4.0 | 3.9 | 4.0 | 2.9 |
| INHIBITION OXID LB/1000 BBL 0.4 MAX | | | | | | | | | |
| GRAVITY API 60F | 67.0 | 67.0 | 66.7 | 67.4 | 68.3 | 68.4 | 68.1 | 68.1 | 67.6 |
| COLOR SAYBOLT RED | RED | RED | RED | RED | RED | RED | RED | RED | RED |
| DOCTUR TEST | NEG | NEG | NEG | MERC | NEG | NEG | NEG | NEG | NEG |
| CORKOSION 2 HOURS 212F 1 MAX | 1A | 1A | 1A | 1A | 1A | 1A | 1A | 1A | 1A |
| WATER AND SUSPENDED MATTER NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE |
| VAPOR PRESSURE LBS 5.5-7.0 | 6.5 | 6.4 | 6.2 | 6.5 | 6.4 | 6.4 | 6.8 | 6.8 | 6.4 |
| GUMS AIR JET MG/100 ML 3.0 MAX | 0.2 | 0.6 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.6 | 0.2 |
| GUMS POT AIR JET MG/100 ML 6.0 MAX | 2.6 | 3.2 | 3.5 | 1.7 | 0.5 | 1.5 | 2.5 | 1.9 | 0.7 |
| GUMS PGT PRECIPIT MG/100 ML 2.0 MAX | 0.4 | 0.2 | 0.1 | 0.3 | 0.2 | 0.1 | 0.7 | 0.6 | 0.1 |
| ANILINE POINT ASTM DEG F | 141.4 | 142.0 | 138.5 | 140.3 | 142.3 | 141.5 | 142.0 | 141.5 | 138.4 |
| ANILINE GRAVITY CONSTANT 7500 MIN 1* | 9474 | 9514 | 9236 | 9456 | 9719 | 9679 | 9670 | 9636 | 9356 |
| WATER REACT VOC CHANGE ML 2 MAX | 0.0 | 1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 |
| WATER REACTION 2 MAX | 1 | 18 | 1 | 1 | 18 | 1 | 1 | 18 | 18 |
| FREEZING POINT DEGREES F -76 MAX | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | 8-112 | -112 |
| SULFUR WEIGHT PCT | 0.05 MAX | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| TEL ML/GAL CALC | 0.50 MAX | 0.41 | 0.42 | 0.40 | 0.46 | 0.42 | 0.37 | 0.41 | 0.01 |
| KH LEAN D-2700 | 60.0 MIN | 61.3 | 62.3 | 62.1 | 60.7 | 61.4 | 62.7 | 62.9 | 63.0 |
| KR-KICH | 87.0 MIN | 87.1 | 87.5 | 87.7 | 86.5 | 87.5 | 87.5 | 86.2 | 88.3 |
| MAX OLGHELS F | 338 MAX | 292 | 292 | 296 | 295 | 294 | 267 | 294 | 290 |
| RESIDUE PCT | 1.5 MAX | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LOSS PCT | 1.5 MAX | 1.5 | 1.0 | 0.0 | 0.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| 10PCT EVAPORATED DEG F | 167 MAX | 156 | 155 | 161 | 158 | 161 | 153 | 158 | 159 |
| 40PCT EVAPORATED DEG F | 167 MIN | 192 | 192 | 196 | 190 | 191 | 189 | 190 | 188 |
| SUPT EVAP DEGREES F | 227 MAX | 197 | 199 | 202 | 197 | 197 | 195 | 195 | 193 |
| 90PCT EVAP DEGREES F | 275 MAX | 234 | 233 | 237 | 236 | 230 | 231 | 234 | 229 |
| SUM OF 10PCT & 50PCT EVAP 307 MIN | 353 | 354 | 363 | 355 | 355 | 356 | 354 | 353 | 352 |

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500
1* OR GREATER

100-130 AVIATION GASOLINE

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| | | | | | | |
|-------------------------------|--------------|----------|----------|----------|----------|-------|
| BLEND NUMBER | SPEC SHEET | 356 | 381 | 392 | 408 | 424 |
| TANK NUMBER | 6-1 | 349 | 8349 | 8349 | 349 | 862 |
| SAMPLE NUMBER | DATED 6-1-79 | 4276 | 4571 | 4728 | 4919 | 5107 |
| DATE BLEND COMPLETED | 10-16-82 | 11/08/82 | 11/20/82 | 12/03/82 | 12/17/82 | |
| BARRELS ALLENDED | MIL-6-2572E | 16.7 | 14.5 | 9.9 | 14.9 | 13.9 |
| UNFINED CS/CO | | 12.0 | 12.2 | 12.6 | 12.1 | 12.1 |
| UNLUBILITE ALK | | 78.9 | 75.8 | 73.3 | 75.6 | 74.8 |
| SLENDING BUTANE | | 1.3 | 1.5 | 1.6 | 1.1 | 1.5 |
| UNLU. REFDISTALE | | 7.0 | 10.5 | 12.3 | 11.2 | 11.6 |
| GRAVITY API 60 F. | 69.0 | 68.0 | 67.3 | 67.7 | 67.5 | |
| COLOR SAYBOL | GREEN | GREEN | GREEN | GREEN | GREEN | |
| DOCTOR TEST | | NEG | NEG | NEG | NEG | NEG |
| COLLUSION 2 HOURS 212 F. | 1 MAX | 1A | 1A | 1A | 1A | 1A |
| MATERIAL AND SUSPENDED MATTER | NONE | NONE | NONE | NONE | NONE | NONE |
| YAMUR PRESS. REFL | 5.5-7.0 | 6.6 | 6.9 | 6.6 | 6.7 | 6.9 |
| GUMS AIR JET MG/100 ML | 3.0 MAX | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| GUMS PUT. AIR JET MG/100 ML | 9.0 MAX | 0.7 | 3.0 | 1.2 | 1.6 | 2.6 |
| GUMS PUT PRECIPIT MG/100 ML | 2.0 MAX | 1* | 0.2 | 0.4 | 0.1 | 0.3 |
| ATTACHMENT POINT ASTM D66 F | | 169.8 | 164.5 | 140 | 141.5 | 142.0 |
| ANILINE GRAVITY CONSTANT | 750 MIN | 10336 | 9826 | 9422 | 9500 | 9555 |
| MATERIAL REACT. INTERFACE WT% | 2 MAX | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| MATERIAL REACT SEPARATION WT% | 2 MAX | 1 | 18 | 18 | 18 | 18 |
| FREEZING POINT DEGREES F | 76 MAX | **112 | **112 | **112 | **112 | **112 |
| AROMATICS FIA VOLUME PC1 | 5.0 MIN | 2* | 4.6 | 5.6 | 7.6 | 7.3 |
| N SULFUR WEIGHT PCT | 0.05 MAX | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| TEL ML/GAL CALC | 4.60 MAX | 3* | 3.86 | 3.82 | 3.79 | 3.80 |
| KR LEAN D-2100 | 190.0 MIN | 113.9 | 113.1 | 110.1 | 110.5 | 110.6 |
| KR NICH | 136.0 MIN | 137.7 | 136.1 | 135.8 | 135.5 | 130.5 |
| EP DEGREES F | 32.0 MAX | 312 | 322 | 325 | 310 | 316 |
| RESIDUE VOL PCT | 1.5 MAX | 1.5 | 1.0 | 1.0 | 1.0 | 1.0 |
| LOSS PCT | 1.5 MAX | 1.5 | 1.0 | 1.0 | 1.0 | 1.0 |
| 102 EVAP DEGREES F | 167 MAX | 145 | 152 | 152 | 150 | 152 |
| 402 EVAP DEGREES F | 167 MIN | 97 | 201 | 149 | 199 | 201 |
| 502 EVAP DEGREES F | 221 MAX | 206 | 209 | 206 | 206 | 210 |
| 902 EVAP DEGREES F | 275 MAX | 247 | 252 | 259 | 256 | 265 |
| SUM OF 102 & 502 EVAP | 307 MIN | 351 | 404 | 361 | 356 | 362 |

1* MEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER

2* WAIVED BY 6-1 SPEC.

3* 4.0 MAX BY 6-1 SPEC

DISTRIBUTION - GEN.SUPT.UPEK, SUPT. 6-0., BLEND.FUELMAN, BLEND.ENGH, LABORATORY.2

100-130 AVIATION GASOLINE

| | | | | | | | | | |
|----------------------------|----------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| BLEND NUMBER | SPEC SHEET | 204 | 215 | 230 | 241 | 259 | 269 | 278 | 286 |
| TANK NUMBER | 6-1 | 8 349 | 8 62 | 8 62 | 8 369 | 62 | 349 | 8 62 | 8 349 |
| SAMPLE NUMBER | DATE BLEND COMPLETED | 06/22/82 | 07/01/82 | 07/09/82 | 07/17/82 | 07/30/82 | 08/07/82 | 08/13/82 | 08/20/82 |
| BARRELS BLENDED | MIL-G-5572E | 13.9 | 14.9 | 16.8 | 16.1 | 9.3 | 13.9 | 14.7 | 14.6 |
| UNFINED C5C6 | | 20.3 | 19.5 | 19.8 | 18.8 | 21.2 | 17.4 | 10.4 | 10.3 |
| UI10 LITE ALKYL | | 71.7 | 73.0 | 73.0 | 59.8 | 73.7 | 59.8 | 73.9 | 79.5 |
| BLENDING BUTANE | | | | | | | | | |
| UI10 REFORMATE | GREEN | 6.0 | 6.7 | 7.2 | 7.5 | 13.0 | 6.7 | 6.7 | 6.3 |
| GRAVITY API 60 F. | | 68.6 | 68.1 | 69.1 | 67.3 | 67.7 | 66.5 | 67.6 | 69.1 |
| COLOR SAYBOLT | | | | | | | | | |
| DOCTOR TEST | | | | | | | | | |
| CORROSION 2 HOURS 212 F. | 1 MAX | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A |
| WATER-AND-SUSPENDED-MATTER | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE |
| VAPOR PRESS REID | 5.5-7.0 | 6.0 | 6.7 | 6.7 | 6.6 | 6.9 | 6.2 | 6.5 | 6.4 |
| GUMS AIR JET MG/100 ML | 3.0 MAX | 0.9 | 0.2 | 0.4 | 0.4 | 0.4 | 0.2 | 0.4 | 0.4 |
| GUMS POT AIR JET MG/100 ML | 6.0 MAX | 1.5 | 1.8 | 2.3 | 2.4 | 2.5 | 2.6 | 2.0 | 2.0 |
| GUMS POT PRECIP MG/100 ML | 2.0 MAX | 1.2 | 0.8 | 0.1 | 0.9 | 0.1 | 0.4 | 0.4 | 0.3 |
| ANILINE POINT ASTM DEG F | 144.5 | 142.5 | 146.0 | 141.5 | 137.0 | 139.3 | 143.6 | 146.5 | 149.0 |
| ANILINE-GRAVITY-CONSTANT | 7500-MIN | 991.3 | 970.0 | 1000.0 | 952.3 | 927.5 | 926.3 | 970.7 | 993.3 |
| WATER REACT INTERFACE RTG | 2 MAX | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WATER REACT SEPARATION RTG | 2 MAX | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1 | 1 |
| FREEZING POINT DEGREES F | 7.6 MAX | 10.2 | 11.2 | 11.2 | 11.2 | 11.2 | 11.2 | 11.2 | 11.2 |
| AROMATICS FIA VOLUME PCT | 5.0 MIN | 2* | 6.9 | 6.3 | 6.3 | 7.6 | 10.9 | 10.3 | 9.3 |
| SULFUR WEIGHT PCT | 0.05 MAX | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| TEL-MG/GAL-GALC | 6.64 MAX | 3.63 | 3.62 | 3.76 | 3.64 | 3.66 | 3.67 | 3.67 | 3.66 |
| KR LEAN D-2700 | 100.0 MIN | 109.9 | 111.2 | 113.9 | 110.7 | 110.6 | 110.0 | 113.9 | 115.5 |
| KR RICH | 130.0 MIN | 131.5 | 131.1 | 133.5 | 131.2 | 136.2 | 135.6 | 136.5 | 136.4 |
| EP DEGREES F | 33.8 MAX | 329 | 330 | 324 | 320 | 323 | 326 | 321 | 326 |
| RESIDUE VOL PCT | 1.5 MAX | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LOSS PCT | 1.5 MAX | 1.0 | 0.5 | 1.0 | 0.0 | 1.0 | 0.5 | 1.5 | 1.0 |
| 102-EVAP-DEGREES F | 167-MAX | 159 | 151 | 156 | 146 | 146 | 157 | 160 | 155 |
| 402 EVAP DEGREES F | 167 MIN | 197 | 196 | 196 | 194 | 191 | 202 | 205 | 199 |
| 502 EVAP DEGREES F | 221 MAX | 205 | 205 | 204 | 204 | 203 | 210 | 212 | 210 |
| 902 EVAP DEGREES F | 275 MAX | 253 | 254 | 253 | 251 | 257 | 261 | 257 | 251 |
| SUM OF 102 & 502 EVAP | 307 MIN | 355 | 356 | 355 | 348 | 351 | 367 | 372 | 365 |

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER

2* WAIVED BY 6-1 SPEC

3* 4.0 MAX BY 6-1 SPEC

100-130 AVIATION GASOLINE

| | | | | | | | | | | |
|----------------------------|------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| BLEND ALIMENT | SPEC SHEET | 9 | 038 | 6 | 90 | 114 | 133 | 154 | 179 | 191 |
| TANK NUMBER | | A 349 | H 349 | H 349 | 349 | 349 | 349 | 349 | 349 | 349 |
| SAMPLE NUMBER | 6-1 | 97 | 499 | A98 | 1180 | 1511 | 1786 | 1989 | 2273 | 2393 |
| DATE BLEND COMPLETED | 8-1-79 | 01/08/82 | 02/05/82 | 03/05/82 | 03/26/82 | 04-16-82 | 05-03-82 | 05/19-82 | 06/06-82 | 06/14-82 |
| SHARPS DILUTED | MIL-6-552E | 19.0 | 12.5 | 12.6 | 13.4 | 13.9 | 14.4 | 15.9 | 14.9 | 14.8 |
| UNFINED OIL | | 19.4 | 20.6 | 19.5 | 18.0 | 21.0 | 21.0 | 20.3 | 20.9 | 19.0 |
| ULTRALITE ALK | | 65.5 | 64.1 | 69.1 | 76.0 | 68.9 | 66.5 | 71.7 | 70.3 | 73.5 |
| ULVO NFUMATE | | 15.1 | 15.3 | 11.4 | 6.0 | 10.1 | 10.5 | 8.0 | 8.6 | 7.5 |
| GRAVITY API 60 F | 65.6 | 65.7 | 64.6 | 66.3 | 67.4 | 67.2 | 67.4 | 68.3 | 68.8 | 68.8 |
| COLOR SAT BULL | GREEN | GREEN | GREEN | GREEN | GREEN | GREEN | GREEN | GREEN | GREEN | GREEN |
| DUOLUR TEST | | NEG |
| CORROSION 2 MONTHS 212 F. | 1 MAX | 1A |
| WATER AND SUSPENDED MATTER | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE |
| VAPOR PRESSURE | 5.5-7.0 | 5.9 | 6.7 | 6.2 | 6.4 | 6.5 | 6.4 | 6.3 | 6.3 | 6.7 |
| GUMS AIR JET MG/100 ML | 3.0 MAX | 0.2 | 0.2 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| GUMS POT AIR JET MG/100 ML | 6.0 MAX | 1.2 | 2.3 | 1.9 | 1.9 | 2.6 | 1.3 | 1.9 | 2.0 | 2.5 |
| GUMS PUTT PHCPI MG/100 ML | 2.0 MAX | 1.0 | 0.8 | 0.1 | 0.2 | 0.3 | 0.1 | 0.6 | 0.5 | 0.5 |
| ANILINE POINT ASTM DEG F | | 130.5 | 134.0 | 131.2 | 137.5 | 139.5 | 140.3 | 142.0 | 144.0 | 145.0 |
| ANILINE GRAVITY CONSTANT | 7500 MIN | 8823 | 8804 | 8876 | 9116 | 9402 | 9428 | 9571 | 9835 | 9976 |
| WATER REACT INTERFACE RTG | 2 MAX | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WATER REACT SEPARATION RTG | 2 MAX | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| FREEZING POINT DEGREES F | 76 MAX | 8-112 | <-112 | <-112 | <-112 | <-112 | <-112 | <-112 | <-112 | <-112 |
| AROMATICS FIA VOLUME PCI | 5.0 MIN | 20 | 9.6 | 10.2 | 12.0 | 6.7 | 7.9 | 8.3 | 7.1 | 6.7 |
| SULFUR WEIGHT PCI | 0.05 MAX | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| TEL ML/GAL CALC | 0.60 MAX | 30 | 3.90 | 3.84 | 3.82 | 3.92 | 3.83 | 3.80 | 3.79 | 3.51 |
| KN LEAN D-2700 | 100.0 MIN | 110.7 | 107.7 | 106.4 | 109.9 | 110.7 | 112.3 | 109.6 | 110.2 | 112.3 |
| KN RICH | 130.0 MIN | 137.1 | 133.5 | 132.8 | 133.9 | 137.2 | 132.5 | 130.0 | 131.6 | 131.6 |
| EP DEGREES F | 338 MAX | 338 | 338 | 338 | 336 | 336 | 336 | 327 | 330 | 326 |
| RESIDUE YUL PCI | 1.5 MAX | 1.0 | 1.0 | 1.0 | 1.5 | 1.5 | 1.0 | 1.0 | 1.0 | 1.0 |
| LUSS PCI | 1.5 MAX | 1.0 | 0.5 | 0.5 | 1.5 | 1.5 | 1.0 | 1.0 | 1.5 | 1.5 |
| 10% EVAP DEGREES F | 167 MAX | 161 | 155 | 156 | 152 | 153 | 153 | 145 | 153 | 152 |
| 40% EVAP DEGREES F | 167 MIN | 205 | 202 | 200 | 202 | 202 | 199 | 194 | 197 | 199 |
| 50% EVAP DEGREES F | 221 MAX | 213 | 211 | 212 | 211 | 208 | 201 | 201 | 207 | 208 |
| 90% EVAP DEGREES F | 275 MAX | 269 | 271 | 274 | 272 | 267 | 252 | 260 | 255 | 255 |
| SUM OF 10% & 50% EVAP | 307 MIN | 374 | 366 | 366 | 369 | 363 | 366 | 360 | 360 | 360 |

1. HEAT OF COMBUSTION MAY BE WAIVED IF AGE IS 7500 OR GREATER

2. WAIVED BY G-1 SPEC

3. 4.0 MAX BY G-1 SPEC

DISTRIBUTION - GEN.SUPT.OPEN, SUPV, PRUC, ENGR, SUPT, H.U., BLEND, FUREMAN, BLEND, ENGR, LABORATORY.?

100-130 AVIATION GASOLINE

| | | | | | | | | | | |
|-------------------------------------|----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| BLEND NUMBER | SPTC SHEET | 007 | 043 | 077 | 116 | 147 | 175 | 202 | 220 | 247 |
| TANK NUMBER | 6-1 | 349 | 349 | 349 | 349 | 349 | 349 | 349 | 349 | 349 |
| SAMPLE NUMBER | 6-1 | 109 | 104 | 1055 | 1657 | 1995 | 2310 | 2630 | 2855 | 3143 |
| DATE BLEND COMPLETED | DATED 10-15-76 | 01-06-79 | 02-03-79 | 03-03-79 | 04-06-79 | 04-20-79 | 05-10-79 | 06-08-79 | 06-25-79 | 07-13-79 |
| BARRELS BLENDED | MIL-B-5572E | 14.7 | 12.0 | 16.0 | 15.0 | 14.9 | 15.0 | 16 | 15.5 | 10.6 |
| 11L BBL IN TANK AFT BLEND 65-71 | | | | | | | | | | |
| UNLEADED CS/C6 | 25.3 | 28.6 | 23.9 | 14.0 | 24.3 | 25.0 | 23.8 | 22.2 | 10.3 | |
| UL10 LITE ALK | 54.6 | 54.6 | 56.0 | 66.1 | 56.0 | 57.7 | 57.1 | 66.3 | 79.3 | |
| BLENDING BUTANE | | | | | | | | | | |
| UL100 REFORMULATE | 19.9 | 16.6 | 20.1 | 16.6 | 16.9 | 17.3 | 18.0 | 15.9 | 9.9 | |
| GRAVITY API 60 F. | 63.7 | 63.9 | 63.5 | 65.3 | 64.5 | 65.1 | 64.9 | 65.5 | 66.8 | |
| COLOR SATBUT | GREEN | GREEN | GREEN | GREEN | GREEN | GREEN | GREEN | GREEN | GREEN | |
| DOCTOR TEST | NEG | NEG | NEG | NEG | NEG | NEG | NEG | NEG | NEG | |
| CORROSION 2 MUUR3 212 F. 1 MAX | 1B | 1A |
| WATER AND SUSPENDED MATTER | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE |
| VAPOR PRESSURE ML10 | 5.5-7.0 | 6.2 | 6.3 | 6.5 | 6.6 | 6.3 | 6.2 | 6.5 | 6.5 | 6.2 |
| GUNS AIR JET MG/100 ML | 3.0 MAX | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| GUNS PIST AIR JET MG/100 ML | 6.0 MAX | 1.9 | 1.4 | 1.6 | 0.4 | 1.6 | 1.2 | 0.5 | 3.1 | 1.6 |
| GUNS PIST PRECIPIT MG/100 ML2.0 MAX | 0.4 | 0.4 | 0.4 | 0.3 | 1.2 | 0.6 | 0.5 | 0.2 | 0.1 | 0.2 |
| ANILINE POINT ASTM DEG F | 121.2 | 123.5 | 122.5 | 131.2 | 136.5 | 126.5 | 129.0 | 133.0 | 139.7 | |
| ANILINE GRAVITY CONSTANT | 7500 MIN 10 | 7720 | 7692 | 7779 | 8567 | 8804 | 8365 | 8372 | 8712 | 9332 |
| WATER REACTYL CHANGE ML | 2 MAX | 0.0 | 0.0 | 0.0 | 18 | 0.0 | 0 | 0.0 | 0.0 | 0.0 |
| WATER REACTION | 2 MAX | 1 | 1 | 18 | 0.5 | 1 | 1 | 1 | 1 | 1 |
| FREEZING POINT DEGREES F | -76 MAX | 0-112 | 0-112 | 0-112 | 0-112 | 0-112 | 0-112 | 0-112 | 0-112 | 0-112 |
| ANUMAJICS STA VOLUME PCT | 5.0 MIN 2* | 15.6 | 13.3 | 14.1 | 11.1 | 11.4 | 12.5 | 11.4 | 10.2 | 6.0 |
| SULFUR WEIGHT PCT | 0.05 MAX 3* | 40.01 | 0.01 | 0.01 | 0.00 | 40.01 | 40.01 | 0.01 | 0.01 | 27.01 |
| TEL MG/100 CALC | 4.60 MAX 3* | 3.61 | 3.55 | 3.61 | 3.56 | 3.65 | 3.60 | 3.60 | 3.72 | 3.93 |
| KR LEAN D-2700 | 100.0 MIN | 104.5 | 104.5 | 103.5 | 107.2 | 105.3 | 106.5 | 106.0 | 105.1 | 109.6 |
| KR RICH | 130.0 MIN | 132.2 | 130.2 | 131.2 | 131.8 | 131.0 | 130.4 | 130.8 | 130.4 | 133.5 |
| MAX DEGREES F | 330 MAX | 334 | 336 | 336 | 336 | 336 | 336 | 332 | 326 | 338 |
| RESIDUE PCT | 1.5 MAX | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.5 | 1.5 | 1.5 |
| LOSS PCT | 1.5 MAX | 0.5 | 0.0 | 0.5 | 1.0 | 0 | 1.5 | 1.5 | 1.0 | 1.5 |
| 102 EVAP DEGREES F | 167 MAX | 149 | 153 | 151 | 157 | 155 | 152 | 144 | 151 | |
| 402 EVAP DEGREES F | 167 MIN | 192 | 194 | 196 | 201 | 197 | 198 | 195 | 197 | 198 |
| 502 EVAP DEGREES F | 221 MAX | 203 | 206 | 206 | 210 | 208 | 206 | 207 | 207 | |
| 902 EVAP DEGREES F | 275 MAX | 270 | 271 | 271 | 273 | 273 | 269 | 269 | 267 | |
| SUM-OF-102-502 EVAP | 302 MIN | 352 | 359 | 357 | 367 | 363 | 360 | 350 | 350 | 357 |

1* HEAT OF COMBUSTION MAY BE WAIVED IF ACC IS 7500 OF GREATER

2* WAIVED BY 6-1 SPEC

3* 4.0 MAX 6-1 SPEC

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GEORGE V. DYROFF
editor

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Aviation Fuels

INTRODUCTION

IT IS DIFFICULT TO DISCUSS AVIATION FUELS without reviewing the development history of the various types of aviation fuels and describing quality requirements in terms of official specifications produced by the co-operative efforts of engine manufacturers, airline operators, fuel suppliers, and appropriate government departments. These documents define the required fuel properties and specify the standard test methods to be used. The international validity of these specifications and rigid enforcement ensures that fuels of uniform quality are available on a worldwide basis for all types of aircraft engines.

It is not feasible to include full details of all major international specifications in this chapter. Even summaries of the main requirements would be of little permanent value, since these specifications are revised and updated frequently to meet new aircraft needs or reflect changing supply situations. However, the basic content of the various specifications covering similar grades of fuel do not differ greatly, and, with few exceptions, the same fuel properties are controlled in each. Typical examples of the physical and chemical property requirements contained in current specifications are included for each of the main aviation gasoline and jet fuel grades.

HISTORICAL DEVELOPMENT OF AVIATION FUELS

Aviation gasolines for spark-ignition engines reached their development peak in the 1939 to 1945 war years. The advent of the gas turbine inhibited further piston engine development, and, although large quantities of aviation gasoline will be re-

quired for many years, quality requirements are unlikely to change significantly.

The first aviation gas-turbine engines were regarded as having noncritical fuel requirements. Since ordinary illuminating kerosine was the original development fuel, the first turbine fuel specifications were written largely around the properties and test methods associated with this well-established product. With increased complexity in design of the engine and its control, fuel specification tests have become inevitably more complicated and numerous. Current demands for improved performance, economy, and overhaul life will indirectly continue the trend towards additional tests; nevertheless, the optimum compromise between fuel quality and availability is achieved largely by the current fuel specifications.

AVIATION GASOLINE

Composition and Manufacture

Aviation gasoline is the most complex fuel produced in a refinery. Strict process control is required to ensure that the stringent (and sometimes conflicting) specifications are met for volatility, calorific value, and antiknock ratings. In addition, careful handling is required during storage and distribution to guard against various forms of contamination which can affect such properties as volatility, gum values, and the copper strip corrosion test.

Aviation gasoline consists substantially of hydrocarbons. Sulfur-containing and oxygen-containing impurities are limited strictly by specification and only certain additives are permitted (refer to the section on Aviation Fuel Additives).

The main component of high-grade avi-

ation gasolines is isooctane produced in the alkylation process by reaction of refinery butenes with isobutane over acid catalysts. To meet volatility requirements for the final blend, a small proportion of isopentane (obtained by superfractionation of light straight-run gasoline) is added. The aromatic component required to improve rich mixture rating is usually a catalytic reformate. The amount of aromatic components added is limited indirectly by the gravimetric calorific value requirement.

Only grade 80 fuel can include a proportion of straight-run gasoline because straight-run gasolines, which contain varying amounts of paraffins, naphthenes, and aromatics invariably lack the necessary branch-chain paraffins (isoparaffins) required to produce the higher grade fuels.

Specifications

Content

Aviation fuel specifications generally contain three main sections covering suitability, composition, and chemical and physical requirements.

The suitability section is included as a safeguard against the possible failure in service of a fuel which meets all the published physical and chemical tests in the specification. It throws the onus on the fuel producer to obey the spirit as well as the letter of the law. This philosophy is inherent in all aviation fuel specifications.

The composition section stipulates that the fuel must consist entirely of hydrocarbons except for trace amounts of approved additives, such as alkyl lead anti-knock additive, dyes, and oxidation inhibitors. Its main importance is in listing the approved additives and, indirectly, in excluding any nonhydrocarbon blending components such as oxygenates, which might be used to improve a critical property of the fuel at the ultimate expense of other fuel properties.

The chemical and physical requirements section is the one most familiar to users since it carefully defines the allowable limits for many chemical and physical properties of the fuel and the standard test methods to be employed.

Fuel Grades

About six basic fuel grades have been in use since the 1939 to 1945 war period. In recent years, the diminishing demand for aviation gasoline has led to a reduction in the number of grades available. With fewer fuel grades, manufacturing, storage, and handling costs were reduced with subsequent benefits to consumers. At present, three grades—80, 100, and 100 lowlead—are specified in ASTM Specification for Aviation Gasolines (D 910).

Specifications covering the various grades have been drawn up by a number of bodies, and these have been revised as engine requirements changed. The most commonly quoted aviation gasoline specifications are those issued by the U.S. Department of Defense (military specifications), the British Ministry of Defense (DERD¹ specifications), and the American Society for Testing and Materials (ASTM D 910). Table 1 lists the main aviation gasoline specifications in current use and indicates the various grades together with their identifying dye colors.

Due to the international nature of aviation activities, the technical requirements of all the Western specifications are virtually identical, and only differences of a minor nature exist between the specifications issued in the various major countries. The Soviet GOST specifications (and their East European equivalents) differ in the grades covered and also in respect to some of the limits applied, but, in general, the same fuel properties are controlled, and most test methods basically are similar to their Western equivalents [American Society for Testing and Materials (ASTM) and Institute of Petroleum (IP) standards]. Soviet aviation gasoline grades are summarized in Table 2.

Table 3 provides detailed requirements for aviation gasoline as contained in ASTM Specification for Aviation Gasolines (D 910). In general, the main technical requirements of all other Western specifica-

¹In current issues of the British Military Specifications, the traditional term "D.Eng.R.D." has been abbreviated to "DERD" (Directorate of Engine Research and Development). For uniformity, this new abbreviation is used throughout this chapter, even for obsolete specifications.

iation gasolines—main international specification grades.

| Carrying Color | Nominal Antiknock Characteristics, Lean/Rich | NATO Code Number | Current Specifications | | | | Use |
|----------------|--|-------------------|--|---|------------|-----|-----------------------------|
| | | | DERD 2485 British Ministry of Defense | MIL-G-5572 U.S. Department of Defense ^b | ASTM D 910 | | |
| Colorless | 73 | F-13 ^a | ... | ... | ... | ... | blending component |
| Colorless | 80 | ... | ... | ... | ... | ... | blending, historic |
| Red | 80/87 | F-12 | 80 | 80/87 | 80 | 80 | minor civil |
| Blue | 91/96 | F-15 ^a | 100LL | obsolete | 100LL | 100 | major civil |
| Blue | 100/130 | F-18 | 100LL | 100/130 | 100LL | 100 | minor military |
| Green | 100/130 | ... | 100 | ... | ... | ... | |
| Brown | 108/135 | ... | ... | obsolete | ... | ... | |
| Purple | 115/145 | F-22 | 115 | 115/145 | ... | ... | military—virtually obsolete |

^aObsolete designation.

^bSpecification MIL-G-5572 was withdrawn in 1988.

TABLE 2. Soviet aviation gasoline grades.

| Specification | Grade | Color | Use |
|---------------|-----------------------|---------------|----------|
| GOST-1012 | B.70 | colorless | obsolete |
| GOST-1012 | B.91/115 ^a | green | current |
| GOST-1012 | B.95/130 ^a | yellow | current |
| GOST-5760 | B.100/130 | bright orange | obsolete |
| | BA(115/160) | varies | obsolete |

^aIn regular and premium qualities.

tions are virtually identical to those in Table 3, although differences occur in the number of grades covered and, in some cases, the amount of tetraethyl lead (TEL) permitted. The various grades within the specification differ fundamentally in only a few vital respects, such as color, antiknock ratings, and TEL content. This is true of all the Western aviation gasoline specifications. The two remaining grades in the Soviet GOST specification are subdivided, somewhat curiously, into ordinary and premium qualities with differing limits for aromatics, olefins, sulfur, and acidity.

The limits specified for Western grades of aviation gasoline were, in most cases, dictated originally by military aircraft engine requirements. Since then, the performance requirements for civil and military aircraft engines have changed very little. However, improved fuel manufacturing techniques and the reduced demand for certain grades has allowed fuel suppliers to produce modified fuel grades more suited to market requirements. In some cases, the objective has been to offer

a technically superior fuel; in other cases, the aim has been the reduction of production, storage, and handling costs by providing a fuel suitable for use in a wider range of engine types than was possible with the standard grades.

Characteristics and Requirements

Antiknock Properties

The various fuel grades are classified by their "antiknock" quality characteristics as determined in single-cylinder laboratory engines. Knock, or detonation, in an engine is a form of abnormal combustion where the air/fuel charge in the cylinder ignites spontaneously in a localized area instead of being consumed progressively by the spark-initiated flame front. Knocking combustion can damage the engine and give serious power loss if allowed to persist. The various grades are designed to guarantee knock-free operation for a range of engines from those used in light aircraft up to high-powered transport and military types.

TABLE 3. Detailed requirements for aviation gasolines.*

| | Grade 80 | Grade 100 | Grade 100LL |
|--|----------|--|-------------|
| Knock value, lean rating: | | | |
| Minimum octane number | 80 | 100 | 100 |
| Knock value, rich rating: | | | |
| Minimum octane number | 87 | 100 | 100 |
| Minimum performance number | | 130 | 130 |
| Color | Red | Green | Blue |
| Dye content: | | | |
| Permissible blue dye, max, mg/U.S. gal | 0.5 | 4.7 | 5.7 |
| Permissible yellow dye, mg/U.S. gal | None | 5.9 | None |
| Permissible red dye, max, mg/U.S. gal | 8.65 | None | None |
| Tetraethyl lead, max, mL/U.S. gal | 0.5 | 4.0 | 2.0 |
| gPb/L | 0.14 | 1.12 | 0.56 |
| Requirements for All Grades | | | |
| Distillation temperature, °C (°F): | | | |
| 10% evaporated, max temp | | 75(167) | |
| 40% evaporated, min temp | | 75(167) | |
| 50% evaporated, max temp | | 105(221) | |
| 90% evaporated, max temp | | 135(275) | |
| Final boiling point, max, °C (°F) | | 170(338) | |
| Sum of 10 and 50% evaporated temperatures, min, °C (°F) | | 135(307) | |
| Distillation recovery, min, % | | 97 | |
| Distillation residue, max, % | | 1.5 | |
| Distillation loss, max, % | | 1.5 | |
| Net heat of combustion, min, Btu/lb (MJ/kg) | | 18720 (43.54) | |
| Vapor pressure: | | | |
| min, kPa(psi) | | 38(5.5) | |
| max, kPa(psi) | | 49(7.0) | |
| Copper strip corrosion, max | | No. 1 | |
| Potential gum (5-h aging gum), max, mg/100 mL | | 6 | |
| Visible lead precipitate, max, mg/100 mL | | 3 | |
| Sulfur, max 96m | | 0.05 | |
| Freezing point, max, °C(°F) | | −58(−72) | |
| Water reaction | | Volume change not to exceed ± 2 mL | |
| Permissible antioxidants, max, lb/1000 bbl (42 gal) | | 4.2 | |

*ASTM Specification for Aviation Gasolines (D 910-85).

The antiknock ratings of aviation gasolines are determined in standard ASTM laboratory engines by matching their performance against reference blends of pure isooctane (2,2,4-trimethyl pentane) and n-heptane. Fuel rating is expressed as an octane number (ON) which is defined as the percentage of isooctane in the matching reference blend. Fuels of higher performance than pure isooctane (100 ON) are tested against blends of isooctane with various amounts of antiknock additive. The rating of such fuel is expressed as a performance number (PN) which is defined as the maximum knock-free power output obtained from the fuel expressed as a percentage of the power obtainable on isooctane.

The antiknock rating of fuel varies ac-

cording to the air/fuel mixture strength employed. This fact is used in defining the performance requirements of the higher grade aviation fuels. As mixture strength is increased (richened), the additional fuel acts as an internal coolant and suppresses knocking combustion which, in turn, permits a higher power rating to be obtained. Since maximum power output is the prime requirement of an engine under rich take-off conditions, the "rich mixture performance" of a fuel is determined in a special supercharged single-cylinder engine using ASTM Test for Knock Characteristics of Aviation Fuels by the Supercharge Method (D 909/IP 119). Similarly, economic cruising operation of an engine is obtainable with weak (lean) mixture strengths. "Weak mixture performance" is determined by

ASTM Test for Knock Characteristics of Motor and Aviation Fuels by the Motor Method (D 2700/IP 236).

Until 1975, ASTM Specification for Aviation Gasolines (D 910) designated aviation gasoline grades with two numbers, for example, "grade 100/130." The lower number denoted an antiknock of 100 minimum by the lean mixture test procedure, and the higher number 130 minimum by the rich mixture procedure. Although the ASTM specification now uses only one number to designate grade (the number from the lean mixture procedure) some other specifications still use both.

Volatility

All internal combustion engine fuels must be easily convertible from storage in the liquid form to the vapor phase in the engine to allow formation of the combustible air/fuel vapor mixture. If gasoline fuel volatility is too low, liquid fuel enters the cylinders and washes lubricating oil from the walls and pistons. This would increase engine wear and cause dilution of the crankcase oil. Poor volatility can also give rise to critical maldistribution of mixture strength between cylinders. If volatility is too high, fuel can vaporize in the fuel tank and supply lines giving undue venting losses and the possibility of fuel starvation through "vapor lock" in the fuel lines. The cooling effect due to rapid vaporization of excessive amounts of highly volatile material also can cause ice formation in the carburetor under certain conditions of humidity and air temperature. Many modern aircraft have anti-icing devices on the engines including the provision of carburetor heating.

Distillation characteristics are determined with a procedure (ASTM D 86/IP 123) in which a sample of the fuel is distilled and the vapor temperature recorded for the percentages of evaporation or distillation throughout the range. Distillation points are selected to control volatility in the following ways:

1. The percent evaporated at 75°C (167°F) controls front-end volatility. Not less than 10%, but not more than 40% of the fuel must evaporate at that temperature. The minimum value ensures that volatility is adequate for normal cold

starting. The maximum value controls vapor lock, fuel system vent losses, and carburetor icing.

2. The requirement that at least 50% of the fuel be evaporated at 105°C (221°F) ensures that the fuel has even distillation properties and does not consist of low-boiling and high-boiling components only. This provides control over the rate of engine warm-up and stabilization of slow-running conditions.

3. The requirement that the sum of the 10 and 50 percent evaporated temperatures exceed 135°C (307°F) also controls the overall volatility and indirectly places a lower limit on the 50 percent point. The clause is an additional safeguard against excessive fuel volatility.

4. The requirement that a minimum of 90% of the fuel be evaporated at 135°C (275°F) controls the proportion of less volatile fuel components and, therefore, the amount of unvaporized fuel passing through the engine manifold into the cylinders. The limit represents a compromise between ideal fuel distribution characteristics and commercial considerations of fuel availability which could be affected adversely by further restriction of this limit.

5. The final distillation temperature of 170°C (338°F) maximum excludes any undesirable heavy material which could cause fuel maldistribution and also dilution of the crankcase oil.

All spark-ignition engine fuels have a vapor pressure which is a measure of the tendency of the more volatile fuel components to escape from the fuel tank in the form of vapor. When an aircraft climbs rapidly to a high altitude, the atmospheric pressure over the fuel is reduced and may become less than the vapor pressure of the fuel at its prevailing temperature. If this occurs, the fuel will "boil," and considerable quantities of the more volatile components will escape as vapor through the tank vents.

Vapor pressure for aviation gasolines is controlled and determined by the ASTM Test for Vapor Pressure of Petroleum Products (Reid Method) (D 323/IP 69). Limits are between 38 and 49 kPa (5.5 to 7.0 psi). The lower limit is an additional check on adequate volatility for engine starting. The up-

per limit controls excessive vapor formation during high-altitude flight and "weathering" losses in storage.

Density and Heat of Combustion

No great variation in either density or heat of combustion occurs in modern aviation gasolines since they depend on hydrocarbon composition which is already closely controlled by other specification properties. Both factors have relatively greater importance with jet fuels as discussed in detail later.

Freezing Point

Maximum freezing point values are set for all types of aviation fuel as a guide to the lowest temperature at which the fuel can be used without risk of separation of solidified hydrocarbons. Such separation could lead to fuel starvation through clogging of fuel lines or filters or loss in available fuel load due to retention of solidified fuel in the tanks. The low freezing point requirement also virtually precludes the presence of benzene which, while a high octane material, has a very high freezing point.

The standard freezing-point test involves cooling the fuel until a slurry of crystals form throughout the fuel and noting the temperature at which all crystals disappear on rewarming the fuel. Freezing points are determined by ASTM Test for Freezing Point of Aviation Fuels (D 2386/IP 16).

Storage Stability

Aviation fuel must retain its required properties for long periods of storage in all kinds of climates. Unstable fuels oxidize and form polymeric oxidation products which remain as a resinous solid or "gum" on induction manifolds, carburetors, valves, etc. as the gasoline is evaporated. Formation of this undesirable gum must be limited strictly, and it is assessed by the existent and accelerated (or potential) gum tests.

The existent gum value is the amount of gum actually present in the fuel at the time of the test. It is determined by ASTM Test for Existence Gum in Fuels by Jet Evaporation (D 381/IP 131). The accelerated gum test, ASTM Test for Oxidation Stabil-

ity of Aviation Fuels (Potential Residue Method) (D 873/IP 138), predicts the possibility of gum forming during protracted storage and decomposition and precipitation of the antiknock additive.

To ensure that the strict limits of the stability specification clauses are met, aviation gasoline components are given special refining treatments to remove the trace impurities responsible for instability. In addition, limited quantities of approved oxidation inhibitors are added. Currently, little trouble is experienced with gum formation or degradation of anti-knock additive.

Sulfur Content

Total sulfur content of aviation gasoline is limited to 0.05 percent mass maximum because most sulfur compounds have a deleterious effect on the antiknock efficiency of alkyl lead compounds. If sulfur content were not limited, specified antiknock values would not be reached for highly leaded grades of aviation fuel. Sulfur content is estimated by ASTM Test for Sulfur in Petroleum Products (Lamp Method) (D 1266/IP 107) or X-Ray Spectrographic Method (D 2622).

Some sulfur compounds can have a corroding action on the various metals of the engine system. Effects vary according to the chemical type of sulfur compound present. Fuel corrosivity is assessed by its action on a copper strip used in ASTM Test for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test (D 130/IP 154).

Water Reaction

The original intent of the water reaction test was to prevent the addition of high octane and water soluble components such as alcohol to aviation gasoline. The test methods involved shaking 80 mL of fuel with 20 mL of water under standard conditions and observing phase volume changes and interface condition. Many specifications for aviation gasoline now have phase separation requirements in addition to those for volume change and interface condition. Water Reaction of Aviation Fuels (D 1094/IP 289) rates all three of these criteria.

Automotive (Motor) Gasoline—Use In Aircraft

In general and at the date of this printing, reciprocating aviation engines and the fuel systems in aircraft so powered are designed to operate on one of the grades of fuel specified in ASTM Specification for Aviation Gasolines (D 910), or equivalent. Most major aviation piston engine manufacturers specifically exclude motor gasoline from their list of approved fuels. Many fuel manufacturers also disapprove of the use of motor gasolines in any aircraft. The suitability of motor gasoline for use in aircraft is limited for both technical and safety reasons which are explained below.

Motor gasoline can vary in both composition and quality from supplier to supplier, from country to country, and, in temperate climates, from season to season; in comparison to aviation gasoline, motor gasoline is not a closely or uniformly specified product. A particular variable in recent years is the increasing inclusion of strong detergent additives and of alcohols and/or other oxygenates in motor gasoline.

Availability and cost considerations have encouraged many owners of light aircraft to seek acceptance of motor gasoline as an alternative to aviation gasoline. In recognition of this trend and in order to maintain regulation and control of motor gasoline use, various civil aviation regulatory agencies around the world have extended supplemental or special certification provisions to permit the use of motor gasoline in a limited number of specified aircraft types which are considered, because of design features, to be less sensitive to fuel properties. In the United States of America, such supplemental type certificates (STCs) specify motor gasoline meeting the requirements of ASTM Specification for Automotive Gasoline (D 439). However, the responsibility for any consequences arising from the adoption of alternative fuels such as motor gasoline rests with the owner/operator of the aircraft, the parties who have sought and received approval, and the regulatory agencies that granted said approvals.

The compositional and property differences between motor gasoline and aviation gasoline are detailed below in relation to their potential adverse effects on engine/

aircraft operation and flight safety. These factors should be reviewed and evaluated before use of motor gasoline in aircraft.

1. Motor gasolines have a wider distillation range than aviation fuels. This could promote poor distribution of the high antiknock components of the fuel in some carbureted engines. Further, the octane ratings of motor gasoline and aviation gasoline are not comparable due to the different test methods used to rate the two types of fuels. Preignition and detonation conditions could develop due to the appreciable difference in actual antiknock performance of motor and aviation fuels of apparent similar octane ratings.

2. Higher volatility and vapor pressures of motor gasolines could overtax the vapor handling capabilities of certain engine/airframe combinations and could lead to vapor lock or carburetor icing. Fire hazards could also be increased.

3. Motor gasoline has a shorter storage stability lifetime than aviation gasoline and can form gum deposits which can induce poor mixture distribution and other engine mechanical side effects such as valve sticking.

4. Due to higher aromatics content and the possible presence of oxygenates, motor gasoline could have solvent characteristics which are unsuitable for some aircraft engine/airframe combinations. Seals, gaskets, flexible fuel lines, and some fuel tank materials could be affected.

5. Motor gasoline may contain additives which could prove incompatible with certain in-service engine or airframe components. The concentration of additives such as detergents is being continually revised to meet the requirements of advanced automotive fuel injection systems. Alcohols or other oxygenates could increase the tendency for the fuel to hold water, either in solution or in suspension. Other additives, not considered here, could also lead to problems not specifically addressed in this document.

6. The testing and quality protection measures applied to automotive gasoline are much less stringent than for aviation fuels. There is a greater possibility of contamination occurring and less possibility of it being detected. Because motor

gasolines meet less stringent requirements, compositional extremes still meeting D 439 might cause undefined difficulties in certain aircraft. Furthermore, D 439 is being continually revised.

7. The antiknock compounds used in leaded motor gasolines contain an excess of chlorine and bromine-containing lead scavengers, whereas aviation gasolines contain a lesser concentration of bromine compounds only. Chlorine compounds give more corrosive combustion products. In addition, lead phasedown regulations in some countries may result in motor gasoline containing insufficient lead to prevent excessive valve seat wear in certain engines.

The above factors illustrate that use of motor gasoline in aircraft may involve certain risks that the potential user must assess.

AVIATION TURBINE FUELS (JET FUELS)

Background

Aircraft gas-turbine engines require a fuel with quite different properties from those for aviation gasoline. Probably the greatest difference is that antiknock value is of no importance and is replaced by the need for a heating fuel of good combustion characteristics and high-energy content. Illuminating kerosine was chosen as the fuel for the first generation of engines largely because of its ready availability, low-fire hazard, good combustion properties, and, not least, the war-time need to conserve gasoline supplies. As engine and fuel system designs have become more complicated, so have the fuel specifications become more varied and restrictive.

Jet fuel quality worldwide is dictated on the commercial side largely by the British Ministry of Defence (DERD) specifications and those of the airlines, engine manufacturers, and industry groups such as ASTM and the International Air Transport Associations (IATA). At airports around the world, jet fuel for airlines is delivered frequently from jointly operated systems in which fuel from a number of suppliers is comingled. This practice has led to the

development of a Joint Fueling Systems Check List, which embraces the most critical requirements of the major specifications.

Military jet fuel is dictated largely by the U.S. Department of Defense (U.S. MIL) specifications and corresponding DERD specifications. Grades of commercial and military fuels are virtually identical in basic properties and differ mainly in the types of additives permitted. The only significant exception is in the case of the fuel types used in the Soviet Union and most East European countries. These grades are based on USSR state standards (GOST specifications) and differ in several major respects from their nearest "Western" equivalents.

In the People's Republic of China, early grades of aviation turbine fuel were also based on USSR Standards, but, for recently introduced grades, Western standards and test methods are being adopted.

Only two basic types of jet fuel are in general use worldwide: the kerosine type and the wide-cut gasoline type. The former is a modified development of the illuminating kerosine originally used in gas-turbine engines. The latter is a wider boiling-range material which includes some gasoline fractions, developed in the United States of America primarily for military use, to improve on availability from crude oil. In addition, a number of specialized fuel grades are required for limited military use either as referee fuels or, more particularly, in special high-performance military aircraft.

Composition and Manufacture

Aviation turbine fuels are manufactured predominantly from straight-run kerosines, or kerosine/naphtha blends in the case of wide-cut fuel, from the atmospheric distillation of crude oil. Straight run kerosine from some sweet crudes will meet all the requirements of the jet fuel specification without further refinery processing, but for the majority of crudes, the kerosine fraction will contain trace constituents which have to be removed before the kerosine is merchantable as jet fuel. This is normally effected by hydrotreating (hydrofining) or by a chemical sweetening process (for example, Merox). For further detail on

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 | | T90 | | Ole- fins | Arom- atics | Satu- rates | C | T | MTBE | EtOH | ETBE | IPA | TBA | NB | Article | pg (5) | Table (5) | Fuel | Comments | |
|-----|-----------|-----|-----|------|------|--------------|----------------|----------------|------|-----|------|------|------|-----|-----|------------|-------------|-----------|--------------|--------------|----------------|--|
| | | (F) | (F) | (1) | (2) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (3) | (4) | (5) | (5) | | | |
| 1 | 1.7 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 92.2 | US4,571,439 | 6 | 5 | polymer gas | | |
| 2 | 1.7 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 92.2 | US4,579,990 | 4 | 40 | polymer gas | | |
| 3 | 2.6 | . | . | 0.0 | 72.6 | 27.4 | * | 100 | . | . | . | . | . | . | . | 98.5 | US5,041,208 | 11 | 64 | cat gas | | |
| 4 | 3.0 | 231 | 326 | 3.5 | 43.0 | 53.5 | * | 100 | . | . | . | . | . | . | . | 89.7 | US4,437,436 | 9 | 50 | Pt-USDY | | |
| 5 | 3.6 | . | . | 0.0 | 47.5 | 52.5 | * | 100 | . | . | . | . | . | . | . | 94.1 | US5,041,208 | 11 | 30 | B | | |
| 6 | 3.6 | . | . | 0.0 | 50.3 | 49.7 | * | 100 | . | . | . | . | . | . | . | 94.5 | US5,041,208 | 11 | 30 | HDT | | |
| 7 | 3.8 | 284 | 368 | . | . | . | . | . | . | . | . | . | . | . | . | 86.5 | US4,818,250 | 8 | 63 | cat gas | | |
| 8 | 4.1 | 177 | 207 | . | . | . | . | . | . | . | . | . | . | . | . | . | SAE 780612 | 175 | 2 | A | 2 comp T10=159 | |
| 9 | 5.0 | 200 | 316 | 2.3 | 34.0 | 63.7 | * | 100 | 30.0 | . | . | . | . | . | . | 86.8 | SAE 801352 | 11 | 11 | App A-1 R-30 | | |
| 10 | 5.1 | 258 | 378 | 6.1 | 24.8 | 69.1 | * | 100 | . | . | . | . | . | . | . | 86.7 | SAE 780949 | 13 | 13 | T10=184 | | |
| 11 | 5.2 | 247 | . | 22.8 | 30.5 | 46.6 | * | 100 | . | . | . | . | . | . | . | 84.8 | US5,041,208 | 10 | 41 | cat gas | | |
| 12 | 5.2 | 234 | 312 | . | . | . | . | . | . | . | . | . | . | . | . | SAE 780612 | 175 | 2 | 4 | full | | |
| 13 | 5.2 | 230 | 330 | 0.3 | 24.9 | 74.8 | * | 100 | . | . | . | . | . | . | . | 84.5 | CRC 510 | 18 | II, I | 2 | | |
| 14 | 5.2 | 216 | 227 | . | . | . | . | . | 10.0 | . | . | . | . | . | . | 101.0 | US4,812,146 | 6 | 18 | >57% arom | | |
| 15 | 5.2 | 213 | 304 | 18.0 | 29.5 | 52.5 | * | 100 | . | . | . | . | . | . | . | 86.1 | CRC 477 | 17 | II, I | 1 | | |
| 16 | 5.2 | . | . | 22.8 | 30.5 | 46.7 | * | 100 | . | . | . | . | . | . | . | 84.8 | US5,041,208 | 12 | 42 | Joliet | | |
| 17 | 5.3 | 235 | 307 | 12.1 | 28.4 | 59.5 | * | 100 | . | . | . | . | . | . | . | 95.6 | BM 7291 | 4,40 | 1 | 4 | | |
| 18 | 5.3 | 207 | 308 | 19.0 | 27.5 | 53.5 | * | 100 | . | . | . | . | . | . | . | 91.5 | CRC 477 | 17 | II, I | 13 | | |
| 19 | 5.3 | 186 | 314 | 18.1 | 23.2 | 58.7 | * | 100 | 30.0 | . | . | . | . | . | . | 86.6 | SAE 801352 | 11 | 11 | App A-1 F-30 | | |
| 20 | 5.4 | 231 | 323 | 15.0 | 37.5 | 47.5 | * | 100 | . | . | . | . | . | . | . | 86.3 | SAE 770811 | 7 | A-1 | F-11 | | |
| 21 | 5.4 | 205 | 302 | 18.0 | 28.5 | 53.5 | * | 100 | . | . | . | . | . | . | . | 88.8 | CRC 477 | 17 | II, I | 6 | | |
| 22 | 5.4 | 205 | 301 | 5.4 | 23.5 | 71.1 | * | 100 | . | . | . | . | . | . | . | 83.7 | CRC 494 | 20 | II, I | 1 | | |
| 23 | 5.4 | 201 | 338 | . | . | . | . | . | . | . | . | . | . | . | . | 86.3 | CRC 578 | 19 | 3 | B | | |
| 24 | 5.5 | 256 | 361 | 35.5 | 28.5 | 36.0 | * | 100 | . | . | . | . | . | . | . | 91.9 | SAE 770811 | 8 | A-1 | F-18 | | |
| 25 | 5.5 | 235 | 335 | . | . | . | . | . | . | . | . | . | . | . | . | SAE 790203 | 15 | III, II | 15 | | | |
| 26 | 5.5 | 223 | 330 | 20.5 | 36.0 | 43.5 | * | 100 | . | . | . | . | . | . | . | SAE 790203 | 5 | A-1 | FO-6 | | | |

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).

2. Total of Olefins + Aromatics + Saturates.

3. P: No data but Probably Leaded. Cars used leaded fuel at this time.

4. US = U.S. patent, AP = Australian patent.

5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.

7. MTBE added to the reported saturate value. 3% unknowns reported.

8. Compositions in wt%, all others are in vol%. Compositions as reported.

Fuels Survey

20:10 Tuesday, October 18, 1994

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates | C (1) | T (2) | MTBE (%) | EtOH (%) | ETBE (%) | IPA (%) | TBA (%) | NB | Article (3) | Pg (4) | Table (5) | Fuel (5) | Comments |
|-----|-----------|---------|---------|--------------|----------------|----------------|----------|----------|-------------|-------------|-------------|------------|------------|----|----------------|-----------|--------------|-------------|---------------|
| 27 | 5.6 | 243 | 340 | . | . | . | . | . | . | . | . | . | . | . | CRC 578 | 19 | 3 | D | |
| 28 | 5.7 | 253 | 328 | . | . | . | . | . | . | . | . | . | . | . | CRC 455 | 40 | III | B-10 | |
| 29 | 5.7 | 235 | 335 | . | . | . | . | . | . | . | . | . | . | . | US4,444,567 | 3 | 57 | FT-266 | Burns T10=164 |
| 30 | 5.7 | 218 | 294 | 0.6 | 22.3 | 77.1 | * | 100 | . | . | . | . | . | . | CM-79-71 | 16 | II, I | 9 | |
| 31 | 5.7 | 216 | 325 | 1.5 | 40.4 | 58.1 | 100 | 15.0 | . | . | . | . | . | . | SAE 801352 | 11 | App A-1 R-15 | | |
| 32 | 5.7 | 216 | 229 | . | . | . | . | 10.0 | . | . | . | . | . | . | US4,812,146 | 4 | 14 | 1 | >52% arom |
| 33 | 5.7 | 215 | 303 | . | . | . | . | . | . | . | . | . | . | . | CRC 455 | 39 | II | A-10 | |
| 34 | 5.8 | 236 | 317 | 1.5 | 22.8 | 75.7 | * | 100 | . | . | . | . | . | . | CM-79-71 | 16 | II, I | 1 | |
| 35 | 5.8 | 225 | 330 | 18.1 | 17.5 | 64.4 | * | 100 | . | . | . | . | . | . | CRC 510 | 18 | II, I | 2 | |
| 36 | 5.8 | 224 | 322 | 2.1 | 43.4 | 54.5 | 100 | 5.0 | . | . | . | . | . | . | SAE 801352 | 11 | App A-1 R-5 | | |
| 37 | 5.9 | 235 | 343 | . | . | . | . | . | . | . | . | . | . | . | AP213,136 | 9 | b | | |
| 38 | 6.0 | 257 | 346 | . | . | 48.0 | * | . | . | . | . | . | . | . | CRC 520 | 19 | III, I | 16 | |
| 39 | 6.0 | 257 | 346 | . | . | 48.0 | * | . | . | . | . | . | . | . | SAE 821211 | 3 | 1,2 | 16 | |
| 40 | 6.0 | 233 | 356 | . | . | . | . | . | . | . | . | . | . | . | SAE 780611 | 169 | Fig 5 | 6A | |
| 41 | 6.0 | 223 | 332 | 2.0 | 19.5 | 78.5 | * | 100 | . | . | . | . | . | . | CRC 477 | 17 | II, I | 12 | |
| 42 | 6.0 | 223 | 330 | 2.0 | 19.5 | 78.5 | * | 100 | . | . | . | . | . | . | CRC 477 | 17 | II, I | 5 | |
| 43 | 6.0 | 222 | 334 | 22.7 | 13.4 | 63.9 | * | 100 | . | . | . | . | . | . | CM-79-71 | 16 | II, I | 2 | |
| 44 | 6.0 | 220 | 330 | 2.0 | 20.0 | 78.0 | * | 100 | . | . | . | . | . | . | CRC 477 | 17 | II, I | 1 | |
| 45 | 6.0 | 217 | 328 | 11.5 | 39.0 | 49.5 | 100 | . | . | . | . | . | . | . | SAE 770811 | 7 | A-1 | F-14 | |
| 46 | 6.0 | 216 | 229 | . | . | . | . | 10.0 | . | . | . | . | . | . | US4,812,146 | 4 | 39 | 6 | >52% arom |
| 47 | 6.0 | 198 | 303 | . | . | . | . | . | . | . | . | . | . | . | P SAE 780651 | 4 | 2 | BL | |
| 48 | 6.1 | 226 | 323 | . | . | . | . | . | . | . | . | . | . | . | P SAE 710138 | 2 | 2 | low | |
| 49 | 6.1 | 224 | 335 | . | 30.0 | * | . | . | . | . | . | . | . | . | CRC 520 | 19 | III, I | 10 | |
| 50 | 6.1 | 224 | 335 | . | 30.0 | * | . | . | . | . | . | . | . | . | SAE 821211 | 3 | 1,2 | 10 | |
| 51 | 6.1 | 220 | 325 | 1.5 | 41.3 | 57.2 | 100 | 10.0 | . | . | . | . | . | . | SAE 801352 | 11 | App A-1 R-10 | | |
| 52 | 6.1 | 220 | 312 | 0.3 | 23.4 | 76.3 | * | 100 | . | . | . | . | . | . | CRC 510 | 18 | II, I | 9 | |

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 RVP= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates (1) | T | MTBE | ETOH | ETBE | IPA | TBA | NB | Article (3) | Pg (5) | Table (5) | Fuel | Comments |
|-----|--------------|------------|------------|--------------|----------------|-----------------------|-----|------|------|------|-----|-----|-------------|----------------|-------------|--------------|-----------|----------|
| | | | | | | (2) | (%) | (%) | (%) | (%) | (%) | (%) | | | | | | |
| 53 | 6.1 | 212 | 326 | • | • | • | • | • | • | • | • | • | P | SAE 710138 | 2 | 2 | XE | |
| 54 | 6.1 | 170 | 208 | • | • | • | • | • | • | • | • | • | SAE 780612 | 175 | 2 | B | 2 comp | |
| 55 | 6.2 | 254 | 370 | • | • | • | • | • | • | • | • | • | SAE 750419 | App 1 | A | | | |
| 56 | 6.2 | 226 | 331 | 1.6 | 44.6 | 53.8 | 100 | • | • | • | • | • | SAE 801352 | 11 | App A-1 R-0 | | | |
| 57 | 6.2 | 216 | 228 | • | • | • | • | • | • | • | • | • | US4,812,146 | 4 | 39 | 5 | >52% arom | |
| 58 | 6.2 | 215 | 314 | 8.5 | 32.0 | 59.5 | * | 100 | • | • | • | • | CRC 477 | 17 | III, I | 11 | | |
| 59 | 6.2 | 212 | • | • | • | • | • | • | • | • | • | • | P | SAE 720700 | 23 | App B-9 | 1 | |
| 60 | 6.3 | 251 | 336 | • | • | • | • | • | • | • | • | • | CRC 541 | 15 | III, II | 28 | | |
| 61 | 6.3 | 236 | 344 | • | 23.0 | • | * | • | • | • | • | • | CRC 520 | 19 | III, I | 3 | | |
| 62 | 6.3 | 236 | 344 | • | 23.0 | • | * | • | • | • | • | • | SAE 821211 | 3 | 1,2 | 3 | | |
| 63 | 6.3 | 233 | 356 | • | • | • | • | • | • | • | • | • | SAE 780611 | 166 | 4 | 6A | | |
| 64 | 6.3 | 224 | 346 | 22.5 | 26.7 | 50.8 | * | 100 | • | • | • | • | CM-79-71 | 16 | III, I | 12 | | |
| 65 | 6.3 | 217 | 229 | • | • | • | • | 10.0 | • | • | • | • | US4,812,146 | 5 | 41 | 9 | | |
| 66 | 6.3 | 210 | 352 | • | • | • | • | • | • | • | • | • | AP213,136 | 11 | a | AL | | |
| 67 | 6.3 | 195 | 333 | • | • | • | • | • | • | • | • | • | P | SAE 710138 | 2 | 2 | | |
| 68 | 6.3 | 194 | 300 | 1.6 | 27.0 | 71.4 | * | 100 | • | • | • | • | 87.2 | CRC 494 | 20 | III, I | 6 | |
| 69 | 6.4 | 244 | 336 | • | 38.0 | • | * | • | • | 9.8 | • | • | 89.1 | CRC 520 | 19 | III, I | 9 | |
| 70 | 6.4 | 244 | 336 | • | 38.0 | • | * | • | • | 9.8 | • | • | 89.1 | SAE 821211 | 3 | 1,2 | 9 | |
| 71 | 6.4 | 240 | 343 | • | 28.0 | • | * | • | • | • | • | • | 91.0 | CRC 520 | 19 | III, I | 13 | |
| 72 | 6.4 | 240 | 343 | • | 28.0 | • | * | • | • | 9.8 | • | • | 91.0 | SAE 821211 | 3 | 1,2 | 13 | |
| 73 | 6.4 | 236 | 329 | • | 27.0 | • | * | • | • | 9.8 | • | • | 91.2 | CRC 520 | 19 | III, I | 12 | |
| 74 | 6.4 | 236 | 329 | • | 27.0 | • | * | • | • | 9.8 | • | • | 91.2 | SAE 821211 | 3 | 1,2 | 12 | |
| 75 | 6.4 | 226 | 323 | • | • | • | • | • | • | • | • | • | P | SAE 720933 | 2714 | App A-1 | 7 | |
| 76 | 6.4 | 218 | 327 | 1.0 | 40.5 | 58.5 | 100 | • | • | • | • | • | 84.4 | SAE 770811 | 7 | A-1 | F-3 | |
| 77 | 6.4 | 206 | 300 | 6.0 | 42.0 | 52.0 | * | 100 | • | • | • | • | 92.5 | CRC 477 | 17 | II, I | 14 | |
| 78 | 6.4 | 203 | 315 | 17.5 | 30.9 | 51.6 | * | 100 | • | • | • | • | 85.1 | CM-79-71 | 16 | II, I | 8 | |

- * Saturates were calculated by difference: 100% - (aromatics + olefins).
- Total of Olefins + Aromatics + Saturates.
- P: No data but Probably Leaded. Cars used leaded fuel at this time.
- US = U.S. patent, AP = Australian patent.
- For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
- MTBE added to the reported saturate value. 3% unknowns reported.
- Compositions in wt%, all others are in vol%. Compositions as reported.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates | C (1) | T (2) | MTBE (%) | ETOH (%) | ETBE (%) | IPA (%) | TBA (%) | NB R+M/2 (3) | Article (4) | Pg (5) | Table (5) | Fuel | Comments |
|-----|-----------|---------|---------|--------------|----------------|----------------|----------|----------|-------------|-------------|-------------|------------|------------|--------------------|----------------|-----------|--------------|---------|----------|
| 79 | 6.4 | 197 | 295 | 15.7 | 25.3 | 59.0 | 100 | . | . | . | . | . | . | 86.8 | SAE 730474 | 1444 | 1 | A | |
| 80 | 6.4 | 195 | 334 | . | . | . | . | . | . | . | . | . | . | P | SAE 720933 | 2714 | APP A-1 | 5 | |
| 81 | 6.5 | 257 | 339 | . | . | . | . | . | . | . | . | . | . | P | SAE 780611 | 164 | 2 | B1 | |
| 82 | 6.5 | 217 | 228 | . | . | . | 10.0 | . | . | . | . | . | 100.9 | US4,812,146 | 4 | 39 | 2 | | |
| 83 | 6.5 | 215 | 328 | 12.0 | 37.5 | 50.5 | 100 | . | . | . | . | . | 86.5 | SAE 770811 | 7 | A-1 | F-9 | | |
| 84 | 6.5 | 199 | 336 | . | . | . | . | . | . | . | . | . | . | CRC 578 | 18 | 2 | 2 | | |
| 85 | 6.5 | . | . | . | . | . | . | . | . | . | . | . | . | US3,886,759 | 5 | 35 | | | |
| 86 | 6.6 | 260 | 335 | 7.0 | 53.0 | 40.0 | 100 | . | . | . | . | . | . | SAE 790203 | 5 | A-2 | | | |
| 87 | 6.6 | 252 | 366 | . | . | . | . | . | . | . | . | . | . | US4,818,250 | 8 | 63 | FO-16 | | |
| 88 | 6.6 | 245 | 318 | 1.0 | 27.3 | 71.7 | * | 100 | . | . | . | . | . | CM-79-71 | 16 | II, I | 6 | | |
| 89 | 6.6 | 243 | 344 | . | 31.6 | . | * | . | . | . | . | . | . | HES 35-32030 | 11 | 9 | 6.5 | | |
| 90 | 6.6 | 234 | 335 | . | . | . | . | . | . | . | . | . | . | SAE 720932 | 15 | APP A | I | | |
| 91 | 6.6 | 232 | 318 | 4.0 | 28.3 | 67.7 | * | 100 | . | . | . | . | . | 89.1 | CRC 445 | 17 | II | 2 | |
| 92 | 6.6 | 232 | 318 | 4.0 | 28.0 | 68.0 | * | 100 | . | . | . | . | . | CRC 451 | 19 | III | I-2 | | |
| 93 | 6.6 | 232 | 318 | 4.0 | 28.0 | 68.0 | * | 100 | . | . | . | . | . | SAE 710675 | 2 | 2 | 2 | | |
| 94 | 6.6 | 232 | 315 | 4.0 | 26.0 | 70.0 | * | 100 | . | . | . | . | . | CRC 451 | 19 | III | T (b) | | |
| 95 | 6.6 | 231 | 338 | . | . | . | . | . | . | . | . | . | . | CRC 541 | 15 | III, II | 24 | | |
| 96 | 6.6 | 226 | 359 | 4.3 | 21.7 | 74.0 | . | 100 | . | . | . | . | . | API 4310 | 8 | I | I | | |
| 97 | 6.6 | 225 | 338 | . | . | . | . | . | 9.6 | . | . | . | . | CRC 541 | 15 | III, II | 25 | | |
| 98 | 6.6 | 183 | 360 | 15.0 | 16.1 | 68.9 | 100 | . | . | . | . | . | . | 74.4 | CRC 454 | 22 | II | AU-8-79 | |
| 99 | 6.6 | . | . | 4.5 | 40.2 | 55.3 | 100 | . | . | . | . | . | . | 90.8 | SAE 900153 | 2 | 1 | ES2 | |
| 100 | 6.7 | 241 | 343 | . | . | . | . | . | . | . | . | . | . | CRC 578 | 18 | 2 | 4 | | |
| 101 | 6.7 | 241 | 335 | . | 34.0 | . | * | . | . | . | . | . | . | 89.9 | CRC 520 | 19 | III, I | 8 | |
| 102 | 6.7 | 241 | 335 | . | 34.0 | . | * | . | . | . | . | . | . | SAE 821211 | 3 | 1,2 | 8 | | |
| 103 | 6.7 | 232 | 336 | 19.7 | 40.5 | 39.8 | * | 100 | . | . | . | . | . | SAE 780612 | 175 | 2 | 3 | | |
| 104 | 6.7 | 220 | 330 | . | . | . | . | . | 15.0 | . | . | . | . | CRC 578 | 18 | 2 | 9 | | |

- * Saturates were calculated by difference: 100% - (aromatics + olefins).
- Total of Olefins + Aromatics + Saturates.
- P: No data but Probably Leaded. Cars used leaded fuel at this time.
- US = U.S. patent, AP = Australian patent.
- For patents page = column and table = line. 6. Repeat in CRC 451 RVP= 7.7 psi.
- MTBE added to the reported saturate value. 3% unknowns reported.
- Compositions in wt%, all others are in vol%. Compositions as reported.

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RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates (%) | T (%) | MTBE (%) | ETOH (%) | ETBE (%) | IPA (%) | TBA (%) | NB R+M/2 (3) | Article (4) | Pg (5) | Table (5) | Fuel | Comments | |
|-----|-----------|---------|---------|--------------|----------------|--------------------|-------|----------|----------|----------|---------|---------|--------------|--------------|---------|-----------|----------|-----------|--|
| 105 | 6.7 | 220 | 317 | 9.9 | 24.3 | 65.8 | * | 100 | . | . | . | . | 87.3 | CM-79-71 | 16 | II, I | 13 | | |
| 106 | 6.7 | 213 | 302 | 3.8 | 14.2 | 82.0 | * | 100 | . | . | . | . | 86.7 | CRC 510 | 18 | II, I | 5 | | |
| 107 | 6.7 | 210 | 334 | . | . | . | . | . | . | . | . | . | . | P SAE 720933 | 2714 | App A-1 | 6 | | |
| 108 | 6.7 | 210 | 302 | . | . | . | . | . | . | . | . | . | . | CRC 455 | 39 | II | A-20 | | |
| 109 | 6.7 | . | 11.3 | 49.4 | 39.3 | * | 100 | . | . | . | . | . | 91.8 | US5,041,208 | 12 | 42 | Net prod | cat gas | |
| 110 | 6.8 | 246 | 341 | . | 30.0 | . | * | . | . | . | . | . | 87.4 | CRC 520 | 19 | III, I | 5 | | |
| 111 | 6.8 | 246 | 341 | . | 30.0 | . | * | . | . | . | . | . | 87.4 | SAE 821211 | 3 | 1,2 | 5 | | |
| 112 | 6.8 | 232 | 325 | 15.0 | 40.5 | 44.5 | * | 100 | . | . | . | . | . | SAE 790203 | 5 | A-2 | FO-17 | | |
| 113 | 6.8 | 228 | 338 | . | . | . | * | . | . | . | . | . | 8.7 | 90.9 | CRC 541 | 15 | III, II | 23 | |
| 114 | 6.8 | 227 | 350 | . | 27.0 | * | * | . | . | . | . | . | 92.7 | CRC 520 | 19 | III, I | 15 | | |
| 115 | 6.8 | 227 | 350 | . | 27.0 | * | * | . | . | . | . | . | 92.7 | SAE 821211 | 3 | 1,2 | 15 | | |
| 116 | 6.8 | 217 | 341 | 2.9 | 26.7 | 70.4 | * | 100 | . | . | . | . | 91.7 | API 4310 | 8 | I | II | | |
| 117 | 6.8 | 217 | 229 | . | . | . | * | 10.0 | . | . | . | . | 100.6 | US4,812,146 | 4 | 39 | 4 | >52% arom | |
| 118 | 6.8 | 216 | 326 | 10.9 | 24.7 | 64.4 | * | 100 | . | . | . | . | 88.8 | CRC 510 | 18 | II, I | 13 | | |
| 119 | 6.8 | 208 | 335 | . | . | . | * | . | . | . | . | . | . | SAE 780611 | 164 | 2 | A1 | | |
| 120 | 6.8 | 198 | 305 | . | . | . | * | . | . | . | . | . | . | SAE 720932 | 15 | App A | III | | |
| 121 | 6.8 | 195 | 286 | 32.2 | 9.0 | 58.8 | * | 100 | . | . | . | . | 74.4 | CRC 454 | 23 | III | AU-10-79 | | |
| 122 | 6.8 | 191 | 325 | . | . | . | * | . | . | . | . | . | 92.9 | SAE 902132 | 2 | 2 | F | | |
| 123 | 6.8 | 191 | 319 | . | . | . | * | . | . | . | . | . | . | SAE 730593 | 2107 | App A-1 | V-4 | | |
| 124 | 6.8 | 185 | 331 | . | . | . | * | . | . | . | . | . | . | CRC 578 | 18 | 2 | 12 | | |
| 125 | 6.8 | 181 | 328 | . | . | . | * | . | . | . | . | . | . | CRC 578 | 18 | 2 | 7 | | |
| 126 | 6.8 | 180 | 283 | . | . | . | * | . | . | . | . | . | . | P SAE 841386 | 8 | App A | 2 | | |
| 127 | 6.9 | 246 | 329 | . | . | . | * | . | . | . | . | . | . | CRC 455 | 40 | III | B-20 | | |
| 128 | 6.9 | 240 | 294 | 12.4 | 59.8 | 27.8 | * | 100 | . | . | . | . | 94.2 | CRC 519 | D-6 | D-V | 331 | | |
| 129 | 6.9 | 240 | 294 | 12.4 | 59.8 | 27.8 | * | 100 | . | . | . | . | 94.2 | CRC 525 | C-4 | C-IV | 331-80 | | |
| 130 | 6.9 | 238 | 296 | 1.6 | 50.8 | 47.6 | * | 100 | . | . | . | . | 95.5 | CRC 519 | D-5 | D-V | 328 | | |

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).

2. Total of Olefins + Aromatics + Saturates.

3. P: No data but Probably Leaded. Cars used leaded fuel at this time.

4. US = U.S. patent, AP = Australian patent.

5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.

7. MTBE added to the reported saturate value. 3% unknowns reported.

8. Compositions in wt%, all others are in vol%. Compositions as reported.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates | C (1) | T (2) | MTBE | ETOH | ETBE | IPA | TBA | NB | Article (3) | Article (4) | Pg (5) | Table (5) | Fuel | Comments |
|-----|--------------|------------|------------|--------------|----------------|----------------|----------|----------|------|------|------|-----|-----|------|----------------|----------------|-----------|--------------|------|----------|
| 131 | 6.9 | 238 | 296 | 1.6 | 50.8 | 47.6 | 100 | . | . | . | . | . | . | 95.5 | CRC 525 | C-1 | C-I | 328-80 | | |
| 132 | 6.9 | 234 | 336 | . | . | . | . | . | 10.0 | . | . | . | . | . | CRC 578 | 18 | 2 | 14 | | |
| 133 | 6.9 | 232 | 337 | . | . | . | . | . | . | 4.7 | . | . | . | 90.8 | CRC 541 | 15 | III,II | 20 | | |
| 134 | 6.9 | 232 | 337 | . | . | . | . | . | . | . | 4.5 | . | . | 90.5 | CRC 541 | 15 | III,II | 22 | | |
| 135 | 6.9 | 228 | 335 | . | . | . | . | . | . | . | . | . | . | 86.7 | CRC 541 | 15 | III,II | 2 | | |
| 136 | 6.9 | 227 | 345 | 21.7 | 33.1 | 45.2 | * | 100 | . | . | . | . | . | 85.7 | CM-79-71 | 16 | III,II | 16 | | |
| 137 | 6.9 | 226 | 335 | . | . | . | . | . | . | . | 9.3 | . | . | 91.7 | CRC 541 | 15 | III,II | 21 | | |
| 138 | 6.9 | 224 | 304 | 1.0 | 34.0 | 65.0 | * | 100 | . | . | . | . | . | 89.7 | CRC 451 | 19 | III | S | | |
| 139 | 6.9 | 216 | 301 | 5.7 | 33.3 | 61.0 | * | 100 | . | . | . | . | . | 86.2 | CM-79-71 | 16 | II,II | 3 | | |
| 140 | 6.9 | 214 | 337 | 3.4 | 35.4 | 61.2 | * | 100 | . | . | . | . | . | 86.9 | SAE 780949 | 13 | App B-3 | 8R | | |
| 141 | 6.9 | . | . | 18.8 | 31.4 | 49.8 | * | 100 | . | . | . | . | . | 90.9 | SAE 900153 | 2 | 1 | ES3 | | |
| 142 | 7.0 | 237 | 341 | . | . | . | . | . | . | . | . | . | . | 90.1 | CRC 541 | 15 | III,II | 14 | | |
| 143 | 7.0 | 234 | 294 | 11.6 | 27.5 | 60.9 | * | 100 | . | . | . | . | . | 90.2 | CRC 494 | 20 | II,II | 8 | | |
| 144 | 7.0 | 233 | 312 | . | 38.0 | . | * | . | . | 9.8 | . | . | . | 90.0 | CRC 520 | 19 | III,II | 7 | | |
| 145 | 7.0 | 233 | 312 | . | 38.0 | . | * | . | . | 9.8 | . | . | . | 90.0 | SAE 821211 | 3 | 1,2 | 7 | | |
| 146 | 7.0 | 232 | 327 | 13.9 | 26.1 | 60.0 | * | 100 | . | . | . | . | . | 93.4 | CRC 510 | 18 | II,II | 12 | | |
| 147 | 7.0 | 231 | 327 | 1.5 | 29.7 | 68.8 | * | 100 | . | . | . | . | . | 91.1 | CRC 510 | 18 | II,II | 11 | | |
| 148 | 7.0 | 229 | . | . | . | . | * | . | . | . | . | . | . | P | SAE 710136 | 9 | 2 | V | | |
| 149 | 7.0 | 226 | 312 | 4.7 | 32.0 | 63.3 | * | 100 | . | . | . | . | . | 86.7 | SAE 780949 | 13 | App B-3 | 11R | | |
| 150 | 7.0 | 226 | 311 | 1.0 | 21.8 | 77.2 | * | 100 | . | . | . | . | . | 89.3 | CRC 494 | 20 | II,II | 9 | | |
| 151 | 7.0 | 226 | 253 | 5.1 | 70.9 | 24.0 | * | 100 | . | . | . | . | . | 95.9 | CRC 515 | D-6 | D-V | 325 | | |
| 152 | 7.0 | 224 | 367 | 35.1 | 18.6 | 46.3 | * | 100 | . | . | . | . | . | 79.9 | CRC 451 | 103 | D-XI | 242-71 | | |
| 153 | 7.0 | 223 | 339 | . | 20.0 | * | * | . | . | . | . | . | . | 86.4 | CRC 520 | 19 | III,II | 1 | | |
| 154 | 7.0 | 223 | 339 | . | 20.0 | * | * | . | . | . | . | . | . | 86.4 | SAE 821211 | 3 | 1,2 | 1 | | |
| 155 | 7.0 | 221 | 319 | 3.0 | 16.5 | 80.5 | * | 100 | . | . | . | . | . | 91.5 | CRC 494 | 20 | II,II | 10 | | |
| 156 | 7.0 | 216 | 314 | 11.6 | 14.5 | 73.9 | * | 100 | . | . | . | . | . | 92.1 | CRC 510 | 18 | II,II | 10 | | |

- * Saturates were calculated by difference: 100% - (aromatics + olefins).
- Total of Olefins + Aromatics + Saturates.
- P: No data but Probably Leaded. Cars used leaded fuel at this time.
- US = U.S. patent, AP = Australian patent.
- For patents page = column and table = line. 6. Repeat in CRC 451 RVP= 7.7 psi.
- MTBE added to the reported saturate value. 3% unknowns reported.
- Compositions in wt%, all others are in vol%. Compositions as reported.

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates | T | MTBE | EtOH | ETBE | IPA | TBA | NB | Article | Pg (5) | Table (5) | Fuel | Comments |
|-----|--------------|------------|------------|--------------|----------------|----------------|-----|------|------|------|-----|-------|-------------|---------|-----------|--------------|-----------|----------|
| 157 | 7.0 | 215 | 314 | 24.3 | 15.9 | 59.8 | * | 100 | . | . | . | . | 91.3 | CRC 510 | 18 | II, I | 7 | |
| 158 | 7.0 | 214 | 347 | 16.3 | 11.6 | 72.1 | 100 | . | . | . | . | 88.5 | US4,313,738 | 2 | 62 | FT-116 | .28 wt% S | |
| 159 | 7.0 | 214 | 347 | 16.3 | 11.6 | 72.1 | 100 | . | . | . | . | 88.5 | US4,322,304 | 3 | 60 | FT-116 | .28 wt% S | |
| 160 | 7.0 | 214 | 323 | . | . | . | 100 | . | . | . | . | . | SAE 892090 | 4 | 5 | first | | |
| 161 | 7.0 | 212 | 309 | 9.7 | 22.8 | 67.5 | * | 100 | . | . | . | 88.3 | CRC 494 | 20 | II, I | 13 | | |
| 162 | 7.0 | 211 | 328 | 21.0 | 32.0 | 47.0 | 100 | . | . | . | . | . | SAE 790203 | 5 | A-1 | FO-4 | | |
| 163 | 7.0 | 210 | 310 | 7.5 | 31.5 | 61.0 | * | 100 | . | . | . | 88.4 | CRC 477 | 17 | II, I | 8 | | |
| 164 | 7.0 | 208 | 340 | 14.0 | 20.0 | 66.0 | 100 | . | . | . | . | 74.9 | CRC 493 | 114 | D-V | 286 | | |
| 165 | 7.0 | 208 | 317 | 10.5 | 28.5 | 61.0 | * | 100 | . | . | . | 90.8 | CRC 477 | 17 | II, I | 15 | | |
| 166 | 7.0 | 205 | 319 | 17.9 | 28.3 | 53.8 | * | 100 | . | . | . | 83.4 | CM-79-71 | 16 | II, I | 4 | | |
| 167 | 7.0 | 204 | 321 | 21.0 | 30.5 | 48.5 | 100 | . | . | . | . | 86.1 | SAE 770811 | 7 | A-1 | F-12 | | |
| 168 | 7.0 | 204 | 291 | 12.6 | 8.3 | 79.1 | * | 100 | . | . | . | 87.8 | CM-79-71 | 16 | II, I | 14 | | |
| 169 | 7.0 | 195 | 299 | 9.8 | 16.0 | 74.2 | 100 | . | . | . | . | 86.8 | CRC 454 | 22 | II | AU-8-91 | | |
| 170 | 7.0 | 195 | 293 | 10.8 | 21.1 | 68.1 | 100 | . | . | . | . | 87.4 | CRC 467 | 96 | D-IV | 261 | | |
| 171 | 7.0 | 195 | 293 | 10.8 | 21.1 | 68.1 | 100 | . | . | . | . | 87.4 | CRC 476 | 48 | D-IV | 261 | | |
| 172 | 7.0 | 194 | 348 | 12.0 | 15.1 | 72.9 | 100 | . | . | . | . | 82.8 | CRC 445 | 86 | D-IX | 239-71 | | |
| 173 | 7.0 | 194 | 348 | 12.0 | 15.1 | 72.9 | 100 | . | . | . | . | 82.5 | CRC 451 | 103 | D-XI | 239-71 | | |
| 174 | 7.0 | 194 | 348 | 12.0 | 15.1 | 72.9 | 100 | . | . | . | . | 82.8 | SAE 710675 | 15 | A-3 | 239-71 | | |
| 175 | 7.0 | 192 | 325 | 22.0 | 25.8 | 52.2 | 100 | 15.0 | . | . | . | 85.9 | SAE 801352 | 11 | APP A-1 | F-15 | | |
| 176 | 7.1 | 226 | 311 | . | 22.0 | * | * | . | 6.9 | . | . | 86.4 | CRC 520 | 19 | III, I | 2 | | |
| 177 | 7.1 | 226 | 311 | . | 22.0 | * | * | . | 6.9 | . | . | 86.4 | SAE 821211 | 3 | 1,2 | 2 | | |
| 178 | 7.1 | 225 | 303 | 9.2 | 28.8 | 62.0 | * | 100 | . | . | . | 87.7 | CM-79-71 | 16 | II, I | 24 | | |
| 179 | 7.1 | 220 | 308 | 1.7 | 33.0 | 65.3 | * | 100 | . | . | . | 89.3 | CM-79-71 | 16 | II, I | 11 | | |
| 180 | 7.1 | 220 | 229 | . | . | . | 0.0 | . | . | . | . | 100.5 | US4,812,146 | 5 | 12 | 8 | >60% arom | |
| 181 | 7.1 | 215 | 285 | 7.1 | 33.4 | 59.5 | 100 | . | . | . | . | 94.0 | CRC 467 | 96 | D-IV | 265 | | |
| 182 | 7.1 | 215 | 285 | 7.1 | 33.4 | 59.5 | 100 | . | . | . | . | 94.0 | CRC 476 | 48 | D-IV | 265 | | |

- * Saturates were calculated by difference: 100% - (aromatics + olefins).
- Total of Olefins + Aromatics + Saturates.
- P: No data but Probably Leaded. Cars used leaded fuel at this time.
- US = U.S. patent, AP = Australian patent.
- For patents page = column and table = line. 6. Repeat in CRC 451 RVP= 7.7 psi.
- MTBE added to the reported saturate value. 3% unknowns reported.
- Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 | | T90 | | Ole- | Arom- | Satu- | C | T | MTBE | EtOH | ETBE | IPA | TBA | NB | Article | Pg | Table | Comments |
|-----|-----------|-----|-----|------|------|------|-------|-------|-----|-----|------|------|------|-----|-----|------|-------------|-----|---------|--------------|
| | | (F) | (F) | (E) | (F) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (3) | (4) | (5) | (5) | |
| 183 | 7.1 | 215 | 285 | 7.1 | 33.4 | 59.5 | 100 | . | . | . | . | . | . | . | . | 94.0 | SAE 750937 | 6 | 265 | |
| 184 | 7.1 | 214 | 301 | 11.4 | 16.6 | 72.0 | * | 100 | . | . | . | . | . | . | . | 89.2 | CM-79-71 | 16 | II, I | 10 |
| 185 | 7.1 | 209 | 325 | 10.0 | 19.6 | 70.4 | 100 | . | . | . | . | . | . | . | . | 76.9 | CRC 570 | C-1 | C-1 | 368-89/90 |
| 186 | 7.1 | 209 | 325 | 10.0 | 19.6 | 70.4 | 100 | . | . | . | . | . | . | . | . | 76.9 | CRC 575 | C-1 | C-1 | 368-89/90 |
| 187 | 7.1 | 207 | 303 | 35.1 | 17.7 | 47.2 | * | 100 | . | . | . | . | . | . | . | 85.4 | CM-79-71 | 16 | II, I | 7 |
| 188 | 7.1 | 206 | 369 | 21.5 | 31.5 | 47.0 | 100 | . | . | . | . | . | . | . | . | 86.4 | CRC 570 | C-3 | C-3 | 372-89/90 |
| 189 | 7.1 | 206 | 369 | 21.5 | 31.5 | 47.0 | 100 | . | . | . | . | . | . | . | . | 86.4 | CRC 575 | C-3 | C-3 | 372-89/90 |
| 190 | 7.1 | 203 | 314 | 7.5 | 41.5 | 51.0 | * | 100 | . | . | . | . | . | . | . | 88.7 | CRC 477 | 17 | II, I | 7 |
| 191 | 7.1 | 203 | 307 | 0.5 | 19.0 | 80.5 | 100 | . | . | . | . | . | . | . | . | 86.0 | SAE 770811 | 7 | A-1 | F-1 |
| 192 | 7.1 | 202 | 344 | 11.1 | 18.2 | 70.7 | 100 | . | . | . | . | . | . | . | . | 86.0 | CRC 519 | D-5 | D-V | 327 |
| 193 | 7.1 | 202 | 344 | 11.1 | 18.2 | 70.7 | 100 | . | . | . | . | . | . | . | . | 86.0 | CRC 525 | C-1 | C-I | 327-80 |
| 194 | 7.1 | 195 | 310 | 15.0 | 21.7 | 63.3 | 100 | . | . | . | . | . | . | . | . | 80.5 | CRC 467 | 96 | D-IV | 263 |
| 195 | 7.1 | 195 | 310 | 15.0 | 21.7 | 63.3 | 100 | . | . | . | . | . | . | . | . | 80.5 | CRC 476 | 48 | D-IV | 263 |
| 196 | 7.1 | 195 | 310 | 15.0 | 21.7 | 63.3 | 100 | . | . | . | . | . | . | . | . | 80.5 | SAE 750937 | 6 | 6 | 263 |
| 197 | 7.2 | 244 | . | . | . | . | . | . | . | . | . | . | . | . | . | P | SAE 720700 | 23 | App B-9 | 3 |
| 198 | 7.2 | 237 | 331 | . | 30.0 | . | * | . | . | . | . | . | . | . | . | 93.3 | CRC 520 | 19 | III, I | 18 |
| 199 | 7.2 | 237 | 331 | . | 30.0 | . | * | . | . | . | . | . | . | . | . | 93.3 | SAE 821211 | 3 | 1,2 | 18 |
| 200 | 7.2 | 236 | 336 | 2.1 | 41.9 | 56.0 | 100 | . | . | . | . | . | . | . | . | 89.1 | US4,437,436 | 9 | 50 | C |
| 201 | 7.2 | 232 | 334 | 14.0 | 39.0 | 47.0 | 100 | . | . | . | . | . | . | . | . | 85.4 | SAE 790203 | 5 | A-1 | F0-3 |
| 202 | 7.2 | 229 | 335 | 5.0 | 32.0 | 63.0 | 100 | . | . | . | . | . | . | . | . | 85.4 | CRC 544 | C-1 | C-I | 351-84 |
| 203 | 7.2 | 229 | 335 | 5.0 | 32.0 | 63.0 | 100 | . | . | . | . | . | . | . | . | 85.4 | CRC 548 | C-1 | C-I | 351-84 |
| 204 | 7.2 | 224 | 304 | 6.0 | 29.0 | 65.0 | * | 100 | . | . | . | . | . | . | . | 87.3 | CRC 451 | 19 | III | T |
| 205 | 7.2 | 220 | 367 | 35.0 | 18.0 | 47.0 | 100 | . | . | . | . | . | . | . | . | 80.4 | CRC 445 | 86 | D-IX | 242-71PB |
| 206 | 7.2 | 220 | 367 | 35.0 | 18.0 | 47.0 | 100 | . | . | . | . | . | . | . | . | 80.4 | SAE 710675 | 15 | A-3 | 242-71PB |
| 207 | 7.2 | 214 | 309 | 13.5 | 30.0 | 56.5 | 100 | . | . | . | . | . | . | . | . | 86.1 | CRC 454 | 23 | III | AU-10-91 |
| 208 | 7.2 | 213 | 353 | 15.0 | 9.3 | 75.6 | 100 | . | . | . | . | . | . | . | . | 87.7 | US4,294,587 | 2 | 42 | FT-175 Burns |

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).

2. Total of Olefins + Aromatics + Saturates.

3. P: No data but Probably Leaded. Cars used leaded fuel at this time.

4. US = U.S. patent, AP = Australian patent.

5. For patents page = column and table = line. 6. Repeat in CRC 451 RVP= 7.7 psi.

7. MTBE added to the reported saturate value. 3% unknowns reported.

8. Compositions in wt%, all others are in vol%. Compositions as reported.

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates | C (1) | T (2) | MTBE (%) | EtOH (%) | ETBE (%) | IPA (%) | TBA (%) | NB Article (3) | Article (4) | Pg (5) | Table (5) | Fuel | Comments | |
|-----|--------------|------------|------------|--------------|----------------|----------------|----------|----------|-------------|-------------|-------------|------------|------------|----------------------|----------------|------------|--------------|-----------|----------|--|
| 209 | 7.2 | 208 | 345 | 20.0 | 22.0 | 58.0 | 100 | · | · | · | · | · | · | 74.3 | CRC 493 | 114 | D-V | 289 | | |
| 210 | 7.2 | 207 | 286 | 6.0 | 23.0 | 71.0 | * | 100 | · | · | · | · | · | 85.2 | SAE 750763 | 2 | 2 | Clr Comm | | |
| 211 | 7.2 | 207 | 286 | 6.0 | 23.0 | 71.0 | * | 100 | · | · | · | · | · | 85.2 | BERC/RI-76 | 7 | 2 | Clr Comm | | |
| 212 | 7.2 | 204 | 311 | 17.0 | 19.0 | 64.0 | 100 | · | · | · | · | · | · | 75.4 | CRC 497 | 143 | D-V | 292 | | |
| 213 | 7.2 | 204 | 311 | 17.0 | 19.0 | 64.0 | 100 | · | · | · | · | · | · | 75.4 | CRC 500 | 76 | D-IV | 292 | | |
| 214 | 7.2 | 203 | 283 | 11.7 | 8.3 | 80.0 | 100 | · | · | · | · | · | · | 88.1 | CRC 451 | 103 | D-XI | 240-71 | | |
| 215 | 7.2 | 202 | 314 | 7.0 | 42.5 | 50.5 | * | 100 | · | · | · | · | · | 85.9 | CRC 477 | 17 | II, I | 3 | | |
| 216 | 7.2 | 198 | 317 | 14.3 | 15.8 | 69.9 | 100 | · | · | · | · | · | · | 81.5 | CRC 467 | 96 | D-IV | 260 | | |
| 217 | 7.2 | 198 | 317 | 14.3 | 15.8 | 69.9 | 100 | · | · | · | · | · | · | 81.5 | CRC 476 | 48 | D-IV | 260 | | |
| 218 | 7.2 | 197 | 311 | 0.0 | 47.0 | 53.0 | 100 | · | · | · | · | · | · | 96.2 | CRC 493 | 114 | D-V | 288 | | |
| 219 | 7.2 | 195 | 345 | 15.0 | 17.0 | 68.0 | 100 | · | · | · | · | · | · | 74.0 | CRC 479 | 85 | D-V | 269 | | |
| 220 | 7.2 | 195 | 220 | 7.0 | 28.0 | 65.0 | 100 | · | · | · | · | · | · | 89.3 | SAE 730474 | 1444 | 1 | C | | |
| 221 | 7.2 | 192 | 333 | 13.8 | 19.8 | 66.4 | 100 | · | · | · | · | · | · | 77.0 | CRC 561 | C-1 | C-I | 362-87/88 | | |
| 222 | 7.2 | 192 | 333 | 13.8 | 19.8 | 66.4 | 100 | · | · | · | · | · | · | 77.0 | CRC 566 | D-7 | D-III | 362 | | |
| 223 | 7.2 | 192 | 333 | 13.8 | 19.8 | 66.4 | 100 | · | · | · | · | · | · | 77.0 | CRC 567 | 6 | 1 | 362-87/88 | | |
| 224 | 7.3 | 235 | 330 | 14.0 | 39.0 | 47.0 | 100 | · | · | · | · | · | · | 88.8 | CM-79-71 | 16 | II, I | 22 | | |
| 225 | 7.3 | 231 | 327 | 12.0 | 41.5 | 46.5 | 100 | · | · | · | · | · | · | · | SAE 790203 | 5 | A-1 | FO-5 | | |
| 226 | 7.3 | 230 | 333 | 3.2 | 29.1 | 67.7 | * | 100 | · | · | · | · | · | · | · | SAE 790203 | 5 | A-1 | FO-7 | |
| 227 | 7.3 | 230 | 329 | · | · | · | · | · | · | · | · | · | · | · | P | SAE 710138 | 2 | 2 | XF | |
| 228 | 7.3 | 225 | 340 | 20.3 | 33.3 | 46.4 | 100 | · | · | · | · | · | · | 85.9 | CRC 445 | 86 | D-IX | 243-71 | | |
| 229 | 7.3 | 225 | 340 | 20.3 | 33.3 | 46.4 | 100 | · | · | · | · | · | · | 85.9 | CRC 451 | 103 | D-XI | 243-71 | | |
| 230 | 7.3 | 225 | 340 | 20.3 | 33.3 | 46.4 | 100 | · | · | · | · | · | · | 85.9 | SAE 710675 | 15 | A-3 | 243-71 | | |
| 231 | 7.3 | 219 | · | · | · | · | · | · | · | · | · | · | · | · | P | SAE 720700 | 23 | App B-9 | 2 | |
| 232 | 7.3 | 217 | 354 | 33.0 | 16.0 | 51.0 | 100 | · | · | · | · | · | · | · | CRC 523 | D-3 | D-III | 335 | | |
| 233 | 7.3 | 217 | 354 | 33.0 | 16.0 | 51.0 | 100 | · | · | · | · | · | · | · | CRC 525 | C-4 | C-IV | 335-81 | | |
| 234 | 7.3 | 217 | 354 | 33.0 | 16.0 | 51.0 | 100 | · | · | · | · | · | · | · | CRC 533 | C-4 | C-IV | 335-81 | | |

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).

2. Total of Olefins + Aromatics + Saturates.

3. P: No data but Probably Leaded. Cars used leaded fuel at this time.

4. US = U.S. patent, AP = Australian patent.

5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.

7. MTBE added to the reported saturate value. 3% unknowns reported.

8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates (1) | C (2) | T (%) | MTBE (%) | ETOH (%) | IPA (%) | TBA (%) | NB | Article (3) | Table (4) | Pg (5) | Fuel (5) | Comments |
|-----|--------------|------------|------------|--------------|----------------|-----------------------|----------|----------|-------------|-------------|------------|------------|----|----------------|--------------|-----------|-------------|-----------|
| 235 | 7.3 | 217 | 229 | . | . | 31.0 | 58.0 | * | 100 | . | . | . | . | 100.3 | US4,812,146 | 4 | 39 | >53% arom |
| 236 | 7.3 | 212 | 314 | 11.0 | . | . | . | 7.0 | . | . | . | . | . | 88.2 | CRC 477 | 17 | II, I | 10 |
| 237 | 7.3 | 204 | 357 | 34.7 | 12.8 | 52.5 | 100 | . | . | . | . | . | . | 75.9 | CRC 561 | C-3 | C-III | 365-87/88 |
| 238 | 7.3 | 204 | 357 | 34.7 | 12.8 | 52.5 | 100 | . | . | . | . | . | . | 75.9 | CRC 566 | D-7 | D-III | 365 |
| 239 | 7.3 | 201 | 310 | 10.9 | 23.3 | 65.8 | * | 100 | . | . | . | . | . | 88.3 | SAE 740520 | 3 | 2 | 10 |
| 240 | 7.3 | 197 | 327 | 21.0 | 28.0 | 51.0 | 100 | . | . | . | . | . | . | 84.5 | SAE 770811 | 7 | A-1 | F-6 |
| 241 | 7.3 | 195 | 306 | 17.0 | 17.0 | 66.0 | 100 | . | . | . | . | . | . | 80.6 | CRC 479 | 85 | D-V | 272 |
| 242 | 7.3 | 187 | 325 | 28.0 | 21.5 | 50.5 | 100 | 15.0 | . | . | . | . | . | 86.2 | SAE 801352 | 11 | App A-1 | F-15' |
| 243 | 7.3 | . | . | . | . | . | . | . | . | . | . | . | . | 90.4 | US4,899,014 | 11 | 37 | cat gas |
| 244 | 7.3 | . | . | . | . | . | . | . | . | . | . | . | . | 90.3 | US4,899,014 | 11 | 37 | cat gas |
| 245 | 7.4 | 230 | 289 | 2.3 | 58.9 | 38.8 | 100 | . | . | . | . | . | . | 96.5 | CRC 515 | D-5 | D-V | 322 |
| 246 | 7.4 | 225 | 296 | 5.0 | 49.0 | 47.0 | 101 | . | . | . | . | . | . | 96.2 | CRC 493 | 114 | D-V | 291 |
| 247 | 7.4 | 217 | 230 | . | . | 30.0 | 60.5 | * | 100 | . | . | . | . | 100.2 | US4,812,146 | 4 | 39 | >50% arom |
| 248 | 7.4 | 216 | 313 | 9.5 | 23.0 | 57.0 | 100 | . | . | . | . | . | . | 85.9 | CRC 477 | 17 | II, I | 4 |
| 249 | 7.4 | 213 | 330 | 11.0 | 26.5 | 62.5 | 100 | . | . | . | . | . | . | 88.6 | SAE 770811 | 7 | A-1 | F-13 |
| 250 | 7.4 | 212 | 344 | 20.0 | 23.0 | 57.0 | 100 | . | . | . | . | . | . | 74.7 | CRC 544 | C-4 | C-IV | 353-84 |
| 251 | 7.4 | 212 | 344 | 20.0 | 23.0 | 57.0 | 100 | . | . | . | . | . | . | 74.7 | CRC 548 | C-3 | C-III | 353-84 |
| 252 | 7.4 | 205 | 318 | 11.0 | 20.0 | 69.0 | 100 | . | . | . | . | . | . | 86.3 | CRC 493 | 114 | D-V | 287 |
| 253 | 7.4 | 204 | 339 | 15.0 | 20.0 | 65.0 | 100 | . | . | . | . | . | . | 76.6 | CRC 488 | 97 | D-V | 280 |
| 254 | 7.4 | 203 | 284 | 11.0 | 9.0 | 80.0 | 100 | . | . | . | . | . | . | 88.1 | CRC 445 | 86 | D-IX | 240-71PB |
| 255 | 7.4 | 203 | 284 | 11.0 | 9.0 | 80.0 | 100 | . | . | . | . | . | . | 88.1 | SAE 710675 | 15 | A-3 | 240-71PB |
| 256 | 7.4 | 202 | 339 | 5.0 | 19.0 | 76.0 | 100 | . | . | . | . | . | . | 87.6 | SAE 790204 | 10 | 17 | A |
| 257 | 7.4 | 202 | 339 | 5.0 | 19.0 | 76.0 | 100 | . | . | . | . | . | . | 87.6 | SAE 790204 | 10 | 17 | B |
| 258 | 7.4 | 202 | 286 | 5.0 | 53.0 | 42.0 | 100 | . | . | . | . | . | . | 96.3 | CRC 488 | 97 | D-V | 282 |
| 259 | 7.4 | . | . | . | . | . | . | . | . | . | . | . | . | 89.8 | US4,873,389 | 10 | 18 | 1 |
| 260 | 7.4 | . | . | . | . | . | . | . | . | . | . | . | . | 90.0 | US4,873,389 | 10 | 18 | 2 |
| | | | | | | | | | | | | | | | | | cat gas | |
| | | | | | | | | | | | | | | | | | cat gas | |

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).

2. Total of Olefins + Aromatics + Saturates.

3. P: No data but Probably Leaded. Cars used leaded fuel at this time.

4. US = U.S. patent, AP = Australian patent.

5. For patents page = column and table = line. 6. Repeat in CRC 451 RVP= 7.7 psi.

7. MTBE added to the reported saturate value. 3% unknowns reported.

8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates | T | MTBE | ETOH | ETBE | IPA | TBA | NB | Article | pg (5) | Table (5) | Fuel | Comments |
|-----|--------------|------------|------------|--------------|----------------|----------------|-----|------|------|------|-----|-----|------|--------------|-----------|--------------|--------|--------------|
| | | | | (1) | (2) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (3) | (4) | | | | |
| 261 | 7.5 | 240 | 339 | 6.2 | 28.9 | 64.9 | 100 | • | • | • | • | • | 90.3 | SAE 780949 | 12 | App B-2 | 11P | |
| 262 | 7.5 | 237 | 335 | 6.9 | 24.5 | 68.6 | * | 100 | • | • | • | • | 92.5 | CRC 494 | 20 | II,I | 12 | |
| 263 | 7.5 | 234 | 339 | • | • | • | • | 4.3 | • | • | • | • | 91.1 | CRC 541 | 15 | III,II | 18 | ET-2 base |
| 264 | 7.5 | 232 | 327 | • | • | • | • | • | • | • | • | • | 90.6 | CM-125-78 | 139 | C-8 | | |
| 265 | 7.5 | 232 | 312 | 3.8 | 50.4 | 45.8 | 100 | • | • | • | • | • | 97.3 | CRC 570 | C-3 | C-3 | | 373-89/90 |
| 266 | 7.5 | 232 | 312 | 3.8 | 50.4 | 45.8 | 100 | • | • | • | • | • | 97.3 | CRC 575 | C-3 | C-3 | | 373-89/90 |
| 267 | 7.5 | 230 | 337 | • | • | • | • | 8.4 | • | • | • | • | 91.9 | CRC 541 | 15 | III,II | 19 | |
| 268 | 7.5 | 229 | 352 | 13.0 | 44.0 | 43.0 | 100 | • | • | • | • | • | 85.7 | CRC 548 | C-3 | C-III | | 360-85/86 |
| 269 | 7.5 | 229 | 352 | 13.0 | 44.0 | 43.0 | 100 | • | • | • | • | • | 85.7 | CRC 553 | C-3 | C-III | | 360-85/86 |
| 270 | 7.5 | 228 | 367 | • | • | • | • | • | • | • | • | • | 85.7 | CRC 541 | 15 | III,II | 27 | |
| 271 | 7.5 | 220 | 292 | 0.1 | 30.5 | 69.4 | * | 100 | • | • | • | • | 87.1 | CRC 510 | 18 | III,I | 6 | |
| 272 | 7.5 | 220 | 285 | 4.0 | 17.0 | 79.0 | 100 | • | • | • | • | • | 95.6 | CRC 445 | 86 | D-IX | | 241-71PB (6) |
| 273 | 7.5 | 220 | 285 | 4.0 | 17.0 | 79.0 | 100 | • | • | • | • | • | 95.6 | SAE 710675 | 15 | A-3 | | 241-71PB |
| 274 | 7.5 | 218 | 300 | 3.1 | 29.9 | 67.0 | 100 | • | • | • | • | • | 94.5 | CRC 467 | 96 | D-IV | 262 | |
| 275 | 7.5 | 218 | 300 | 3.1 | 29.9 | 67.0 | 100 | • | • | • | • | • | 94.5 | CRC 476 | 48 | D-IV | 262 | |
| 276 | 7.5 | 218 | 289 | 12.5 | 23.7 | 63.8 | 100 | • | • | • | • | • | 94.5 | CRC 451 | 103 | D-XI | 244-71 | |
| 277 | 7.5 | 218 | 286 | 3.2 | 46.4 | 50.4 | 100 | • | • | • | • | • | 98.5 | CRC 570 | C-1 | C-1 | | 370-89/90 |
| 278 | 7.5 | 218 | 286 | 3.2 | 46.4 | 50.4 | 100 | • | • | • | • | • | 98.5 | CRC 575 | C-1 | C-1 | | 370-89/90 |
| 279 | 7.5 | 216 | 363 | 10.1 | 24.0 | 62.9 | 97 | 4.9 | • | • | • | • | 87.7 | SAE 902129 | 5 | 1 | | EC-1 |
| 280 | 7.5 | 216 | 282 | 6.9 | 32.4 | 60.7 | 100 | • | • | • | • | • | 94.8 | SAE 730474 | 144 | 1 | B | |
| 281 | 7.5 | 215 | 350 | 32.5 | 25.0 | 42.5 | * | 100 | • | • | • | • | 88.0 | CRC 510 | 18 | III,I | 4 | |
| 282 | 7.5 | 214 | 344 | • | • | • | • | 9.7 | • | • | • | • | 87.9 | CRC 541 | 15 | III,II | 12 | |
| 283 | 7.5 | 214 | 291 | 13.0 | 24.0 | 63.0 | 100 | • | • | • | • | • | 93.5 | CRC 445 | 86 | D-IX | | 244-71PB |
| 284 | 7.5 | 214 | 291 | 13.0 | 24.0 | 63.0 | 100 | • | • | • | • | • | 93.5 | SAE 710675 | 15 | A-3 | | 244-71PB |
| 285 | 7.5 | 210 | 325 | 15.0 | 19.0 | 66.0 | 100 | • | • | • | • | • | 77.6 | CRC 488 | 97 | D-V | 277 | |
| 286 | 7.5 | 209 | 320 | • | • | • | • | • | • | • | • | • | • | P SAE 710138 | 2 | 2 | XC | |

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).

2. Total of Olefins + Aromatics + Saturates.

3. P: No data but Probably Leaded. Cars used leaded fuel at this time.

4. US = U.S. patent, AP = Australian patent.

5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.

7. MTBE added to the reported saturate value. 3% unknowns reported.

8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 088/077, 243 f. 6/14/93 Jessup ctd.

RVP ≤ 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

| OBS | RVP (psi) | % | | | % | | | % | | | % | | | % | | | % | | | % | | |
|-----|--------------|------------|------------|--------------|----------------|----------------|-----|-----|------|------|------|-----|-----|----------|----------|-----------|--------------|------|----------|---|--|--|
| | | T50 (F) | T90 (F) | Ole- fins | Arom- atics | Satu- rates | (1) | T | MTBE | EtOH | ETBE | IPA | TBA | NB | Article | Pg (5) | Table (5) | Fuel | Comments | | | |
| 287 | 7.5 | 208 | 255 | 0.0 | 7.0 | 76.0 | | 83 | 10.4 | . | . | . | . | 86.7 | RFG | Clean Air | X | 9 | 7/90 (8) | | | |
| 288 | 7.5 | 204 | 335 | . | . | . | | . | . | 12.7 | . | . | . | 90.7 | SAE | 902132 | 2 | 2 | D | | | |
| 289 | 7.5 | 200 | 327 | 8.6 | 22.7 | 68.7 | * | 100 | . | . | . | . | . | 86.3 | CM-79-71 | 16 | III, I | 19 | | | | |
| 290 | 7.5 | 197 | 317 | 5.4 | 19.0 | 75.6 | | 100 | . | . | . | . | . | 75.8 | CRC | 515 | D-5 | 320 | D-V | | | |
| 291 | 7.5 | 196 | 304 | 0.0 | 19.0 | 60.0 | | 79 | 11.3 | . | . | . | . | 86.8 | RFG | Clean Air | X | 8 | | | | |
| 292 | 7.5 | 185 | 331 | 0.4 | 30.6 | 69.0 | * | 100 | . | . | . | . | . | 87.3 | SAE | 750451 | 8 | 1 | 2 | | | |
| 293 | 7.5 | . | . | . | . | . | | . | . | . | . | . | . | GMR-6589 | 23 | 4 | 4 | | Minimum | | | |

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line.
6. Repeat in CRC 451 Rvp= 7.7 p
7. MTBE added to the reported saturate value.
8. Compositions in wt%, all others are in vol%. Compositions as reported.